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SCRIPTURE continued from last Volume.

Scripture.

55 Jeremiah.

JEREMIAH was called to the prophetic office in the 13th year of the reign of Josiah the son of Amon, A. M. 3376, A. C. 628, and continued to prophecy upwards of 40 years, during the reigns of the degenerate princes of Judah, to whom he boldly threatened those marks of the divine vengeance which their rebellious conduct drew on themselves and their country. After the destruction of Jerusalem by the Chaldeans, he was suffered by Nebuchadnezzar to remain in the desolate land of Judea to lament the calamities of his infatuated countrymen. He was afterwards, as he himself informs us, carried with his disciple Baruch into Egypt, by Johanan the son of Kareah.

It appears from several passages that Jeremiah committed his prophecies to writing. In the 36th chapter we are informed, that the prophet was commanded to write upon a roll all the prophecies which he had uttered; and when the roll was destroyed by Jehoiakim the king, Jeremiah dictated the same prophecies to Baruch, who wrote them together with many additional circumstances. The works of Jeremiah extend to the last verse of the 51st chapter; in which we have these words, "Thus far the words of Jeremiah." The 52d chapter was therefore added by some other writer. It is, however, a very important supplement, as it illustrates the accomplishment of Jeremiah's prophecies respecting the fate of Zedekiah.

56 Chronological arrangement of his writings.

The prophecies of Jeremiah are not arranged in the chronological order in which they were delivered. What has occasioned this transposition cannot now be determined. It is generally maintained, that if we consult their dates, they ought to be thus placed:

In the reign of Josiah the first 12 chapters.

In the reign of Jehoiakim, chapters xiii. xx. xxi. v. 11, 14.; xxii. xxiii. xxv. xxvi. xxxv. xxxvi. xlv.—xlix. 1—33.

In the reign of Zedekiah, chap. xxi. 1—10. xxiv. xxvii. xxxiv. xxxvii. xxxix. xlix. 34—39. l. and li.

Under the government of Gedaliah, chapters xl. xliv. The prophecies which related to the Gentiles were contained in the 46th and five following chapters, being placed at the end, as in some measure unconnected with the rest. But in some copies of the Septuagint these six chapters follow immediately after the 13th verse of the 25th chapter. Scripture.

Jeremiah, though deficient neither in elegance nor sublimity, must give place in both to Isaiah. Jerome seems to object against him a sort of rusticity of language, no vestige of which Dr Lowth was able to discover. His sentiments, it is true, are not always the most elevated, nor are his periods always neat and compact; but these are faults common to those writers whose principal aim is to excite the gentler affections, and to call forth the tear of sympathy or sorrow. This observation is very strongly exemplified in the Lamentations, where these are the prevailing passions; it is, however, frequently instanced in the prophecies of this author, and most of all in the beginning of the book (L), which is chiefly poetical. The middle of it is almost entirely historical. The latter part, again, consisting of the last six chapters, is altogether poetical (M); it contains several different predictions, which are distinctly marked; and in these the prophet approaches very near the sublimity of Isaiah. On the whole, however, not above half the book of Jeremiah is poetical.

57 The book of Lamentations.

The book of Lamentations, as we are informed in the title, was composed by Jeremiah. We shall present to our reader an account of this elegiac poem from the elegant pen of Dr Lowth.

The Lamentations of Jeremiah (for the title is properly and significantly plural) consist of a number of plaintive effusions, composed on the plan of the funeral dirges, all on the same subject, and uttered without connection as they rose in the mind, in a long course of separate stanzas. These have afterwards been put together, and formed into a collection or correspondent whole. If any reader, however, should expect to find in them an artificial and methodical arrangement of the general subject, a regular disposition of the parts, a perfect connection and orderly succession in the matter,

(L) See the whole of chap. ix. chap. xiv. 17, &c. xx. 14—18.

(M) Chap. xlvi.—li. to ver. 59. Chap. lii. properly belongs to the Lamentations, to which it serves as an exordium.

Scripture. and with all this an uninterrupted ſeries of elegance and correctneſs, he will really expect what was foreign to the prophet's deſign. In the character of a mourner, he celebrates in plaintive ſtrains the obſequies of his ruined country: whatever preſented itſelf to his mind in the midſt of deſolation and miſery, whatever ſtruck him as particularly wretched and calamitous, whatever the inſtant ſentiment of ſorrow dictated, he pours forth in a kind of ſpontaneous effuſion. He frequently pauſes, and, as it were, ruminates upon the ſame object; frequently varies and illuſtrates the ſame thought with different imagery, and a different choice of language; ſo that the whole bears rather the appearance of an accumulation of correſponding ſentiments, than an accurate and connected ſeries of different ideas, arranged in the form of a regular treatiſe. There is, however, no wild incoherency in the poem; the tranſitions are eaſy and elegant.

58 How divided. The work is divided into five parts: in the firſt, ſecond, and fourth chapters, the prophet addreſſes the people in his own perſon, or introduces Jeruſalem as ſpeaking. In the third chapter a chorus of the Jews is repreſented. In the fifth the whole captive Jews pour forth their united complaints to Almighty God. Each of theſe five parts is diſtributed into 22 ſtanzas, according to the number of the letters of the alphabet. In the firſt three chapters theſe ſtanzas conſiſt of three lines. In the firſt four chapters the initial letter of each period follows the order of the alphabet; and in the third chapter each verſe of the ſame ſtanza begins with the ſame letter. In the fourth chapter all the ſtanzas are evidently diſtichs, as alſo in the fifth, which is not acroſtic. The intention of the acroſtic was to aſſiſt the memory to retain ſentences not much connected. It deſerves to be remarked, that the verſes of the firſt four chapters are longer by almoſt one half than Hebrew verſes generally are: The length of them ſeems to be on an average about 12 ſyllables. The prophet appears to have choſen this meaſure as being ſolemn and melancholy.

Lowth. 59 The ſubject and beauty of it. "That the ſubject of the Lamentations is the deſtruction of the holy city and temple, the overthrow of the ſtate, the extermination of the people; and that theſe events are deſcribed as actually accompliſhed, and not in the ſtyle of prediction merely, muſt be evident to every reader; though ſome authors of conſiderable reputation * have imagined this poem to have been compoſed on the death of King Joſiah. The prophet, indeed, has ſo copiouſly, ſo tenderly, and poetically, bewailed the misfortunes of his country, that he ſeems completely to have fulfilled the office and duty of a mourner. In my opinion, there is not extant any poem which diſplays ſuch a happy and ſplendid ſelection of imagery in ſo concentrated a ſtate. What can be more elegant and poetical, than the deſcription of that once flouriſhing city, lately chief among the nations, ſitting in the character of a female, ſolitary, afflicted, in a ſtate of widowhood, deſerted by her friends, betrayed by her deareſt connections, imploring relief, and ſeeking conſolation in vain? What a beautiful perſonification is that of "the ways of Sion mourning becauſe none are come to her ſolemn feaſts?" How tender and pathetic are the following complaints?

* *Joſephus, Jerome, Uſſerius, &c.*

Chap. i. 12, 16. Is this nothing to all you who paſs along the way? behold and ſee,
If there be any ſorrow, like unto my ſorrow, which is Scripture.
inflicted on me;
Which Jehovah inflicted on me in the day of the violence of his wrath.
For theſe things I weep, my eyes ſtream with water;
Becauſe the comforter is far away, that ſhould tranquilize my ſoul:
My children are deſolate, becauſe the enemy was ſtrong.

But to detail its beauties would be to tranſcribe the entire poem."

60 Ezekiel. Ezekiel was carried to Babylon as a captive, and received the firſt revelations from heaven, in the fifth year of Jehoiakim's captivity, A. C. 595. The book of Ezekiel is ſometimes diſtributed under different heads. In the three firſt chapters the commiſſion of the prophet is deſcribed. From the fourth to the thirty-ſecond chapter incluſive, the calamities that befel the enemies of the Jews are predicted, viz. the Ammonites, the Moabites, and Philiſtines. The ruin of Tyre and of Sidon, and the fall of Egypt, are particularly foretold; prophecies which have been fulfilled in the moſt literal and aſtoniſhing manner, as we have been often aſſured by the relation of hiſtorians and travellers. From the 32d chapter to the 40th he inveighs againſt the hypocriſy and murmuring ſpirit of his countrymen, admoniſhing them to reſignation by promiſes of deliverance. In the 38th and 39th chapters he undoubtedly predicts the final return of the Jews from their diſperſion in the latter days, but in a language ſo obſcure that it cannot be underſtood till the event take place. The nine laſt chapters of this book furniſh the deſcription of a very remarkable viſion of a new temple and city, of a new religion and polity.

61 Character as a writer. "Ezekiel is much inferior to Jeremiah in elegance; in ſublimity he is not even excelled by Iſaiah: but his ſublimity is of a totally different kind. He is deep, vehement, tragical; the only ſenſation he affects to excite is the terrible; his ſentiments are elevated, fervid, full of fire, indignant; his imagery is crouded, magnificent, terrific, ſometimes almoſt to diſguſt: his language is pompous, ſolemn, auſtere, rough, and at times unpoliſhed: he employs frequent repetitions, not for the ſake of grace or elegance, but from the vehemence of paſſion and indignation. Whatever ſubject he treats of, that he ſedulouſly purſues, from that he rarely departs, but cleaves as it were to it; whence the connection is in general evident and well preſerved. In many reſpects he is perhaps excelled by the other prophets; but in that ſpecies of compoſition to which he ſeems by nature adapted, the forcible, the impetuous, the great and ſolemn, not one of the ſacred writers is ſuperior to him. His diction is ſufficiently perſpicuous; all his obſcurity conſiſts in the nature of the ſubject. Viſions (as for inſtance, among others, thoſe of Hoſea, Amos, and Jeremiah) are neceſſarily dark and confuſed. The greater part of Ezekiel, towards the middle of the book eſpecially, is poetical, whether we regard the matter or the diction. His periods, however, are frequently ſo rude and incompact, that I am often at a loſs how to pronounce concerning his performance in this reſpect.

Lowth. "Iſaiah, Jeremiah, and Ezekiel, as far as relates to ſtyle, may be ſaid to hold the ſame rank among the Hebrews, as Homer, Simonides, and Æſchylus among the Greeks."

So

Scripture.

62 Daniel.

So full an account of Daniel and his writings has been already given under the article DANIEL, that little remains to be ſaid on that ſubject. Daniel flouriſhed during the ſucceſſive reigns of ſeveral Babyloniſh and Median kings to the conqueſt of Babylon by Cyrus. The events recorded in the 6th chapter were contemporary with Darius the Mede; but in the 7th and 8th chapters Daniel returns to an earlier period, to relate the viſions which he beheld in the three firſt years of Belſhazzar's reign; and thoſe which follow in the four laſt chapters were revealed to him in the reign of Darius. The laſt ſix chapters are compoſed of prophecies delivered at different times; all of which are in ſome degree connected as parts of one great ſcheme. They extend through many ages, and furniſh the moſt ſtriking deſcription of the fall of ſucceſſive kingdoms, which were to be introductory to the eſtabliſhment of the Meſſiah's reign. They characterrize in deſcriptive terms the four great monarchies of the world to be ſucceeded by "that kingdom which ſhould not be deſtroyed."

63 Character of his prophecies.

The whole book of Daniel being no more than a plain relation of facts, partly paſt and partly future, muſt be excluded the claſs of poetical prophecy. Much indeed of the parabolic imagery is introduced in that book; but the author introduces it as a prophet only; as viſionary and allegorical ſymbols of objects and events, totally untinctured with the true poetical colouring. The Jews, indeed, would refuſe to Daniel even the character of a prophet: but the arguments under which they ſhelter this opinion are very futile; for thoſe points which they maintain concerning the conditions on which the gift of prophecy is imparted, the different gradations, and the diſcrimination between the true prophecy and mere inſpiration, are all trifling and abſurd, without any foundation in the nature of things, and totally deſtitute of ſcriptural authority. They add, that Daniel was neither originally educated in the prophetic diſcipline and precepts, nor afterwards lived conformably to the manner of the prophets. It is not, however, eaſy to comprehend how this can diminiſh his claim to a divine miſſion and inſpiration; it may poſſibly enable us, indeed, to aſſign a reaſon for the diſſimilarity between the ſtyle of Daniel and that of the other prophets, and for its poſſeſſing ſo little of the diction and character of poetry, which the reſt ſeem to have imbibed in common from the ſchools and diſcipline in which they were educated.

64 Their authenticity.

The prophecies of Daniel appear ſo plain and intelligible after their accompliſhment, that Porphyry, who wrote in the 3d century, affirms, that they were written after the events to which they refer took place. A little reflection will ſhow the abſurdity of this ſuppoſition. Some of the prophecies of Daniel clearly refer to Antiochus Epiphanes, with whoſe oppreſſions the Jews were too well acquainted. Had the book of Daniel not made its appearance till after the death of Epiphanes, every Jew who read it muſt have diſcovered the forgery. And what motive could induce them to receive it among their ſacred books? It is impoſſible to conceive *one*. Their character was quite the reverſe: their reſpect for the Scripture had degenerated into ſuperſtition. But we are not left to determine this important point from the character of the Jews; we have acceſs to more deciſive evidence: we are ſure that the book of Daniel contains prophecies, for ſome of them have been accompliſhed ſince the time of Porphyry; particularly thoſe reſpecting Antichriſt: now, if it contains any prophecies, who will take upon him to affirm that the divine Spirit, which dictated theſe many centuries before they were fulfilled, could not alſo have delivered prophecies concerning Antiochus Epiphanes?

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The language in which the book of Daniel is compoſed proves that it was written about the time of the Babyloniſh captivity. Part of it is pure Hebrew: a language in which none of the Jewiſh books were compoſed after the age of Epiphanes. Theſe are arguments to a deiſt. To a Chriſtian the internal marks of the book itſelf will ſhow the time in which it was written, and the teſtimony of Ezekiel will prove Daniel to be at leaſt his contemporary *.

* Ezek. xiv. 14. xxviii. 3.

65 Twelve minor prophets.

The twelve minor prophets were ſo called, not from any ſuppoſed inferiority in their writings, but on account of the ſmall ſize of their works. Perhaps it was for this reaſon that the Jews joined them together, and conſidered them as one volume. Theſe 12 prophets preſented in ſcattered hints a lively ſketch of many particulars relative to the hiſtory of Judah and of Iſrael, as well as of other kingdoms; they propheſy with hiſtorical exactneſs the fate of Babylon, of Nineveh, of Tyre, of Sidon, and of Damaſcus. The three laſt prophets eſpecially illuſtrate many circumſtances at a period when the hiſtorical pages of Scripture are cloſed, and when profane writers are entirely wanting. At firſt the Jewiſh prophets appeared only as ſingle lights, and followed each other in individual ſucceſſion; but they became more numerous about the time of the captivity. The light of inſpiration was collected into one blaze, previous to its ſuſpenſion; and it ſerved to keep alive the expectations of the Jews during the awful interval which prevailed between the expiration of prophecy and its grand completion on the advent of Chriſt.

Gray's Key to the Old Teſtament.

66 Prophecies of Hoſea.

Hoſea has been ſuppoſed the moſt ancient of the 12 minor prophets. He flouriſhed in the reign of Jeroboam II. king of Iſrael, and during the ſucceſſive reigns of Uzziah, Jotham, Ahaz, and Hezekiah, kings of Judah. He was therefore nearly contemporary with Iſaiah, Amos, and Jonah. The prophecies of Hoſea being ſcattered through the book without date or connection, cannot with any certainty be chronologically arranged.

67 Character of their ſtyle.

Hoſea is the firſt in order of the minor prophets, and is perhaps, Jonah excepted, the moſt ancient of them all. His ſtyle exhibits the appearance of very remote antiquity; it is pointed, energetic, and conciſe. It bears a diſtinguiſhed mark of poetical compoſition, in that priſtine brevity and condenſation which is obſervable in the ſentences, and which later writers have in ſome meaſure neglected. This peculiarity has not eſcaped the obſervation of Jerome: "He is altogether (ſays he, ſpeaking of this prophet) laconic and ſententious." But this very circumſtance, which anciently was ſuppoſed no doubt to impart uncommon force and elegance, in the preſent ruinous ſtate of the Hebrew literature is productive of ſo much obſcurity, that although the general ſubject of this writer be ſufficiently obvious, he is the moſt difficult and perplexed of all the prophets. There is, however, another reaſon for the obſcurity of his ſtyle: Hoſea propheſied during the reigns of the four kings of Judah, Uzziah, Jotham, Ahaz, and Hezekiah. The duration of his miniſtry, therefore, in what-

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ever manner we calculate, muſt include a very conſiderable ſpace of time. We have now only a ſmall volume of his remaining, which ſeems to contain his principal prophecies; and theſe are extant in a continued ſeries, with no marks of diſtinction as to the times in which they were publiſhed, or the ſubjects of which they treat. There is, therefore, no cauſe to wonder if, in peruſing the prophecies of Hoſea, we ſometimes find ourſelves in a ſimilar predicament with thoſe who conſulted the ſcattered leaves of the Sibyl.

As a ſpecimen of Hoſea's ſtyle, we ſelect the following beautiful pathetic paſſage:

How ſhall I reſign thee, O Ephraim!
How ſhall I deliver thee up, O Iſrael!
How ſhall I reſign thee as Admah!
How ſhall I make thee as Zeboim!
My heart is changed within me;
I am warmed alſo with repentance towards thee.
I will not do according to the fervour of my wrath;
I will not return to deſtroy Ephraim:
For I am God, and not man;
Holy in the midſt of thee, though I inhabit not thy cities.

68 Prophecies of Joel.

Concerning the date of the prophecy of Joel there are various conjectures. The book itſelf affords nothing by which we can diſcover when the author lived, or upon what occaſion it was written. Joel ſpeaks of a great famine, and of miſchiefs that happened in conſequence of an inundation of locuſts; but nothing can be gathered from ſuch general obſervations to enable us to fix the period of his prophecy. St Jerome thinks (and it is the general opinion) that Jael was contemporary with Hoſea. This is poſſibly true; but the foundation on which the opinion reſts is very precarious, viz. That when there is no proof of the time in which a prophet lived, we are to be guided in our conjectures reſpecting it by that of the preceding prophet whoſe epoch is better known. As this rule is not infallible, it therefore ought not to hinder us from adopting any other opinion that comes recommended by good reaſons. Father Calmet places him under the reign of Joſiah, at the ſame time with Jeremiah, and thinks it probable that the famine to which Joel alludes, is the ſame with that which Jeremiah predicted, ch. viii. 13.

69 Character of their ſtyle.

The ſtyle of Joel is eſſentially different from that of Hoſea; but the general character of his diction, though of a different kind, is not leſs poetical. He is elegant, perſpicuous, copious, and fluent; he is alſo ſublime, animated, and energetic. In the firſt and ſecond chapters he diſplays the full force of the prophetic poetry, and ſhows how naturally it inclines to the uſe of metaphors allegories, and compariſons. Nor is the connection of the matter leſs clear and evident than the complexion of the ſtyle: this is exemplified in the diſplay of the impending evils which gave riſe to the prophecy, the exhortation to repentance; the promiſes of happineſs and ſucceſs both terreſtrial and eternal to thoſe who become truly penitent; the reſtoration of the Iſraelites; and the vengeance to be taken of their adverſaries. But while we allow this juſt commendation to his perſpicuity both in language and arrangement, we muſt not deny that there is ſometimes great obſcurity obſervable in his ſubject, and particularly in the latter part of the prophecy.

Lowth on Hebrew Poetry, Sect. 21.

The following prophecy of a plague of locuſts is deſcribed with great ſublimity of expreſſion: Scripture.

For a nation hath gone up on my land,
Who are ſtrong, and without number:
They have deſtroyed my vine, and have made my fig-tree a broken branch.
They have made it quite bare, and caſt it away: the branches thereof are made white.
The field is laid waſte; the ground mourneth *.

* Joel i. 6. 7, 10, &c.

70 Prophecies of Amos.

Amos was contemporary with Hoſea. They both began to prophecy during the reigns of Uzziah over Judah, and of Jeroboam II. over Iſrael. Amos ſaw his firſt viſion two years before the earthquake, which Zechariah informs us happened in the days of Uzziah. See Amos.

Amos was a herdſman of Tekoa, a ſmall town in the territory of Judah, and a gatherer of ſycamore fruit. In the ſimplicity of former times, and in the happy climates of the Eaſt, theſe were not conſidered as diſhonourable occupations. He was no prophet (as he informed Amaziah †), neither was he a prophet's ſon, that is, he had no regular education in the ſchools of the prophets.

† Amos vii. 14.

The prophecies of Amos conſiſt of ſeveral diſtinct diſcourſes, which chiefly reſpect the kingdom of Iſrael; yet ſometimes the prophet inveighs againſt Judah, and threatens the adjacent nations, the Syrians, Philiſtines, Tyrians, Edomites, Ammonites, and Moabites.

71 Their ſtyle.

Jerome calls Amos "rude in ſpeech, but not in knowledge ‡;" applying to him what St Paul modeſtly profeſſes of himſelf §. "Many (ſays Dr Lowth) have followed the authority of Jerome in ſpeaking of this prophet, as if he were indeed quite rude, ineloquent, and deſtitute of all the embelliſhments of compoſition. The matter is, however, far otherwiſe. Let any perſon who has candour and perſpicacity enough to judge, not from the man but from his writings, open the volume of his predictions, and he will, I think, agree with me, that our ſhepherd 'is not a whit behind the very chief of the prophets ||.' He will agree, that as in ſublimity and magnificence he is almoſt equal to the greateſt, ſo in ſplendour of diction and elegance of expreſſion he is ſcarcely inferior to any. The ſame celeſtial Spirit indeed actuated Iſaiah and Daniel in the court and Amos in the ſheep-folds; conſtantly ſelecting ſuch interpreters of the divine will as were beſt adapted to the occaſion, and ſometimes 'from the mouth of babes and ſucklings perfecting praiſe:' occaſionally employing the natural eloquence of ſome, and occaſionally making others eloquent."

‡ *Proem. Comment. in Amos.*

§ 2 Cor. xi. 6.

|| 2 Cor. xi.

Mr Locke has obſerved, that the compariſons of this prophet are chiefly drawn from lions and other animals with which he was moſt accuſtomed; but the fineſt images and alluſions are drawn from ſcenes of nature. There are many beautiful paſſages in the writings of Amos, of which we ſhall preſent one ſpecimen:

Wo to them that are at eaſe in Zion,
And truſt in the mountains of Samaria;
Who are named chief of the nations,
To whom the houſe of Iſrael came:
Paſs ye unto Calneh and ſee,
And from thence go to Hamath the Great;

Then

Scripture. Then go down to Gath of the Philiſtines;
Are they better than theſe kingdoms?
Or their borders greater than their borders?
Ye that put far away the evil day,
And cauſe the ſeat of violence to come near;
That lie upon beds of ivory,
And ſtretch yourſelves upon couches;
That eat the lambs out of the flock,
And the calves out of the midſt of the ſtall;
That chant to the ſound of the viol,
And like David deviſe inſtruments of muſic;
That drink wine in bowls,
And anoint yourſelves with chief ointments;
‖ Ch. vi. 1.—6. *But are not grieved for the affliction of Joſeph* ‖.

72 Of Obadiah. The writings of Obadiah, which conſiſt of one chapter, are compoſed with much beauty, and unfold a very intereſting ſcene of prophecy. Of this prophet little can be ſaid, as the ſpecimen of his genius is ſo ſhort, and the greater part of it included in one of the prophecies of Jeremiah. Compare Ob. 1—9. with Jer. xlix. 14, 15, 16. See OBADIAH.

73 Of Jonah. Though Jonah be placed the ſixth in the order of the minor prophets both in the Hebrew and Septuagint, he is generally conſidered as the moſt ancient of all the prophets, not excepting Hoſea. He lived in the kingdom of Iſrael, and propheſied to the ten tribes under the reign of Joaſh and Jeroboam. The book of Jonah is chiefly hiſtorical, and contains nothing of poetry but the prayer of the prophet. The ſacred writers, and our Lord himſelf, ſpeak of Jonah as a prophet of conſiderable eminence *. See JONAH.

* 2 Kings xiv. 25. Matth. xii. 39. 41. xvi. 4. Luke xi. 29.

Micah began to propheſy ſoon after Iſaiah, Hoſea, Joel, and Amos; and he propheſied between A. M. 3246, when Jotham began to reign, and A. M. 3305, when Hezekiah died. One of his predictions is ſaid † to have ſaved the life of Jeremiah, who under the reign of Jehoiakim would have been put to death for propheſying the deſtruction of the temple, had it not appeared that Micah had foretold the ſame thing under Hezekiah above 100 years before ‡. Micah is mentioned as a prophet in the book of Jeremiah and in the New Teſtament ‖. He is imitated by ſucceeding prophets (N), as he himſelf had borrowed expreſſions from his predeceſſors (O). Our Saviour himſelf ſpoke in the language of this prophet (P).

74 Of Micah. † Jer. xxv. 18—24. ‡ *Joſ. Ant.* lib. x. c. 7. Micah iii. 12. ‖ Matt. ii. 5. John vii. 42.

75 His ſtyle. The ſtyle of Micah is for the moſt part cloſe, forcible, pointed, and conciſe; ſometimes approaching the obſcurity of Hoſea; in many parts animated and ſublime; and in general truly poetical. In his prophecies there is an elegant poem, which Dr Lowth thinks is a citation from the anſwer of Balaam to the king of the Moabites:

Wherewith ſhall I come before Jehovah?
Wherewith ſhall I bow myſelf unto the High God?
Shall I come before him with burnt-offerings,
With calves of a year old?
Will Jehovah be pleaſed with thouſands of rams?
With ten thouſands of rivers of oil?
Shall I give my firſt-born for my tranſgreſſion?
The fruit of my body for the ſin of my ſoul?
He hath ſhowed thee, O man, what is good:
And what doth Jehovah require of thee,
But to do juſtice, and to love mercy,
And to be humble in walking with thy God? Scripture.

76 Of Nahum. Joſephus aſſerts, that Nahum lived in the time of Jotham king of Judah; in which caſe he may be ſuppoſed to have propheſied againſt Nineveh when Tiglath-Pileſer king of Aſſyria carried captive the natives of Galilee and other parts about A. M. 3264. It is, however, probable, that his prophecies were delivered in the reign of Hezekiah; for he appears to ſpeak of the taking of No-Ammon a city of Egypt, and of the inſolent meſſengers of Sennacherib, as of things paſt; and he likewiſe deſcribes the people of Judah as ſtill in their own country, and deſirous of celebrating their feſtivals.

While Jeruſalem was threatened by Sennacherib, Nahum promiſed deliverance to Hezekiah, and predicted that Judah would ſoon celebrate her ſolemn feaſts ſecure from invaſion, as her enemy would no more diſturb her peace. In the ſecond and third chapters Nahum foretels the downfal of the Aſſyrian empire and the final deſtruction of Nineveh, which was probably accompliſhed by the Medes and Babylonians, whoſe combined forces overpowered the Aſſyrians by ſurpriſe "while they were folden together as thorns, and while they were drunken as drunkards," when the gates of the river were opened, the palace demoliſhed, and an "overrunning flood" aſſiſted the conquerors in their devaſtation; who took an endleſs ſtore of ſpoil of gold and ſilver, making an utter end of the place of Nineveh, of that vaſt and populous city, whoſe walls were 100 feet high, and ſo broad that three chariots could paſs abreaſt. Yet ſo completely was this celebrated city deſtroyed, that even in the 2d century the ſpot on which it ſtood could not be aſcertained, every veſtige of it being gone.

It is impoſſible to read of the exact accompliſhment of the prophetic denunciations againſt the enemies of the Jews, without reflecting on the aſtoniſhing proofs which that nation enjoyed of the divine origin of their religion. From the Babyloniſh captivity to the time of Chriſt they had numberleſs inſtances of the fulfilment of their prophecies.

The character of Nahum as a writer is thus deſcribed by Dr Lowth: "None of the minor prophets ſeem to equal Nahum in boldneſs, ardour, and ſublimity. His prophecy, too, forms a regular and perfect poem; the exordium is not merely magnificent, it is truly majeſtic; the preparation for the deſtruction of Nineveh, and the deſcription of its downfal and deſolation, are expreſſed in the moſt vivid colours, and are bold and luminous in the higheſt degree."

77 Of Habakkuk. As the prophet Habakkuk makes no mention of the Aſſyrians, and ſpeaks of the Chaldean invaſions as near at hand, he probably lived after the deſtruction of the Aſſyrian

(N) Compare Zephan. iii. 19. with Micah. iv. 7. and Ezek. xxii. 27. with Micah iii. 11.
(O) Compare Micah. iv. 1—3. and Iſaiah ii. 2—4. Micah iv. 13. with Iſaiah xli. 15.
(P) Compare Micah viii. 6. with Matt. x. 35, 36.

Scripture. Aſſyrian empire in the fall of Nineveh A. M. 3392, and not long before the devaſtation of Judea by Nebuchadnezzar. Habakkuk was then nearly contemporary with Jeremiah, and predicted the ſame events. A general account of Habakkuk's prophecies has already been given under the word HABAKKUK, which may be conſulted. We ſhould, however, farther obſerve, that the prayer in the third chapter is a moſt beautiful and perfect ode, poſſeſſing all the fire of poetry and the profound reverence of religion.

God came from Teman,
And the Holy One from Mount Paran:
His glory covered the heavens,
And the earth was full of his praiſe.
His brightneſs was as the light;
Beams of glory iſſued from his ſide;
And there was the hiding of his power.
Before him went the peſtilence;
And burning coals went forth at his feet.
He ſtood and meaſured the earth;
He beheld and drove aſunder the nations;
The everlaſting mountains were ſcattered;
The perpetual hills did bow.

The prophet illuſtrates this ſubject throughout with equal ſublimity; ſelecting from ſuch an aſſemblage of miraculous incidents the moſt noble and important, diſplaying them in the moſt ſplendid colours, and embelliſhing them with the ſublimeſt imagery, figures, and diction; the dignity of which is ſo heightened and recommended by the ſuperior elegance of the concluſion, that were it not for a few ſhades which the hand of time has apparently caſt over it in two or three paſſages, no compoſition of the kind would appear more elegant or more perfect than this poem.

‖ Heb. x. 37, 38. Rom. i. 17. Gal. iii. 2. Acts xiii. 41. compare with Hab. i. 5.

Habakkuk is imitated by ſucceeding prophets, and his words are borrowed by the evangelical writers ‖.

78 Prophecies of Zephaniah.

Zephaniah, who was contemporary with Jeremiah, propheſied in the reign of Joſiah king of Judah; and from the idolatry which he deſcribes as prevailing at that time, it is probable that his prophecies were delivered before the laſt reformation made by that pious prince A. M. 3381.

The account which Zephaniah and Jeremiah give of the idolatries of their age is ſo ſimilar, that St Iſiodore aſſerts, that Zephaniah abridged the deſcriptions of Jeremiah. But it is more probable that the prophecies of Zephaniah were written ſome years before thoſe of his contemporary; for Jeremiah ſeems to repreſent the abuſes as partly removed which Zephaniah deſcribes as flagrant and exceſſive (Q).

In the firſt chapter Zephaniah denounces the wrath of God againſt the idolaters who worſhipped Baal and the hoſt of heaven, and againſt the violent and deceitful. In the ſecond chapter the prophet threatens deſtruction to the Philiſtines, the Moabites, the Ammonites, and Ethiopians; and deſcribes the fate of Nineveh in emphatic terms: "Flocks ſhall lie down in the midſt of her; all the beaſts of the nations, both the cormorant and bittern, ſhall lodge in her; their voice ſhall ſing in the windows; deſolation ſhall be in the threſholds." In the third chapter the prophet inveighs againſt the pollutions and oppreſſions of the Jews; and concludes with the promiſe, "That a remnant would be ſaved, and that multiplied bleſſings would be beſtowed upon the penitent." The ſtyle of Zephaniah is poetical, but is not diſtinguiſhed by any peculiar elegance or beauty, though generally animated and impreſſive. Scripture.

79 Of Haggai.

Haggai, the tenth of the minor prophets, was the firſt who flouriſhed among the Jews after the Babyloniſh captivity. He began to propheſy in the ſecond year of Darius Hyſtaſpes, about 520 years before Chriſt.

The intention of the prophecy of Haggai was to encourage the diſpirited Jews to proceed with the building of the temple. The only prediction mentioned refers to the Meſſiah, whom the prophet aſſures his countrymen would fill the new temple with glory. So well was this prediction underſtood by the Jews, that they looked with earneſt expectation for the Meſſiah's appearing in this temple till it was deſtroyed by the Romans. But as the victorious Meſſiah, whom they expected, did not then appear, they have ſince applied the prophecy to a third temple, which they hope to ſee reared in ſome future period.

The ſtyle of Haggai, in the opinion of Dr Lowth, is proſaic. Dr Newcome, on the contrary, thinks that a great part of it is poetical.

80 Of Zechariah.

Zechariah was undoubtedly a contemporary of Haggai, and began to propheſy two months after him, in the eighth month of the ſecond year of Darius Hyſtaſpes, A. M. 3484, being commiſſioned as well as Haggai to exhort the Jews to proceed in the building of the temple after the interruption which the work had ſuffered. We are informed by Ezra (vi. 14.), that the Jews proſpered through the propheſying of Zechariah and Haggai.

Zechariah begins with general exhortations to his countrymen, exciting them to repent from the evil ways of their fathers, whom the prophets had admoniſhed in vain. He deſcribes angels of the Lord interceding for mercy on Jeruſalem and the deſolate cities of Judah, which had experienced the indignation of the Moſt High for 70 years, while the neighbouring nations were at peace. He declares, that the houſe of the Lord ſhould be built in Jeruſalem, and that Zion ſhould be comforted. The prophet then repreſents the increaſe and proſperity of the Jews under ſeveral typical figures. He deſcribes the eſtabliſhment of the Jewiſh government and the coming of the Meſſiah. He admoniſhes thoſe who obſerved ſolemn faſts without due contrition, to execute juſtice, mercy, and compaſſion, every man to his brother; not to oppreſs the widow nor the fatherleſs, the ſtranger nor the poor. He promiſes, that God would again ſhow favour to Jeruſalem; that their mournful faſts ſhould be turned into cheerful feaſts; and that the church of the Lord ſhould be enlarged by the acceſſion of many nations.

The 12th verſe of the 11th chapter of this book, which exhibits a prophetic deſcription of ſome circumſtances afterwards fulfilled in our Saviour, appears to be

(Q) Compare Zephaniah i. 4, 5, 9. with Jeremiah ii. 5, 20, 32.

Scripture. be cited by St Matthew (xxvii. 9, 10.) as ſpoken by Jeremiah; and as the 11th, 12th, and 13th chapters have been thought to contain ſome particulars more ſuitable to the age of Jeremiah than to that of Zechariah, ſome learned writers are of opinion that they were written by the former prophet, and have been from ſimilarity of ſubject joined by miſtake to thoſe of Zechariah. But others are of opinion, that St Matthew might allude to ſome traditional prophecy of Jeremiah, or, what is more probable, that the name of Jeremiah was ſubſtituted by miſtake in place of Zechariah.

The 12th, 13th, and 14th chapters contain prophecies which refer entirely to the Chriſtian diſpenſation; the circumſtances attending which he deſcribes with a clearneſs which indicated their near approach.

The ſtyle of Zechariah is ſo ſimilar to that of Jeremiah, that the Jews were accuſtomed to remark that the ſpirit of Jeremiah had paſſed into him. He is generally proſaic till towards the concluſion of his work, when he becomes more elevated and poetical. The whole is beautifully connected by eaſy tranſitions, and preſent and future ſcenes are blended with the greateſt delicacy.

81 Of Malachi. Malachi was the laſt prophet that flouriſhed under the Jewiſh diſpenſation; but neither the time in which he lived, nor any particulars of his hiſtory, can now be aſcertained. It is even uncertain whether the word *Malachi* be a proper name, or denote, as the Septuagint have rendered it, *his angel* (R), that is, "the angel of the Lord." Origen ſuppoſed, that Malachi was an angel incarnate, and not a man. The ancient Hebrews, the Chaldee paraphraſt, and St Jerome, are of opinion he was the ſame perſon with Ezra: but if this was the caſe, they ought to have aſſigned ſome reaſon for giving two different names to the ſame perſon.

As it appears from the concurring teſtimony of all the ancient Jewiſh and Chriſtian writers, that the light of prophecy expired in Malachi, we may ſuppoſe that the termination of his miniſtry coincided with the accompliſhment of the firſt ſeven weeks of Daniel's prophecy, which was the period appointed for ſealing the viſion and prophecy. This, according to Prideaux's account, took place in A. M. 3595; but, according to the calculations of Biſhop Lloyd, to A. M. 3607, twelve years later. Whatever reckoning we prefer, it muſt be allowed that Malachi completed the canon of the Old Teſtament about 400 years before the birth of Chriſt.

It appears certain that Malachi propheſied under Nehemiah, and after Haggai and Zechariah, at a time when great diſorders reigned among the prieſts and people of Judah, which are reproved by Malachi. He inveighs againſt the prieſts (i. 6, &c. ii. 1, 2, &c.); he reproaches the people with having taken ſtrange wives (ii. 11.); he reproves them for their inhumanity towards their brethren (ii. 10. iii. 5.); their too frequently divorcing their wives; their neglect of paying their tithes and firſt-fruits (Mal. iii. 13.). He ſeems to allude to the covenant that Nehemiah renewed with the Lord (iii. 10. and ii. 4, 5, &c.), aſſiſted by the prieſts and the chief of the nation. He ſpeaks of the ſacrifice of the new law, and of the abolition of thoſe of the old, Scripture. in theſe words (i. 10, 11, 12, 13.): "I have no pleaſure in you, ſaith the Lord of hoſts, neither will I accept an offering at your hand. For from the riſing of the ſun, even unto the going down of the ſame, my name ſhall be great among the Gentiles, and in every place incenſe ſhall be offered unto my name, and a pure offering: for my name ſhall be great among the Heathen, ſaith the Lord of hoſts." He declares that the Lord was weary with the impiety of Iſrael; and aſſures them, that the Lord whom they ſought ſhould ſuddenly come to his temple preceded by the meſſenger of the covenant, who was to prepare his way; that the Lord when he appeared ſhould purify the ſons of Levi from their unrighteouſneſs, and refine them as metal from the droſs; and that then the offering of Judah, the ſpiritual ſacrifice of the heart, ſhould be pleaſant to the Lord. The prophet, like one who was delivering a laſt meſſage, denounces deſtruction againſt the impenitent in emphatic and alarming words. He encourages thoſe who feared the name of the Lord with the animating promiſe, that the "Sun of righteouſneſs ſhould ariſe with ſalvation in his rays," and render them triumphant over the wicked. And now that prophecy was to ceaſe, and miracles were no more to be performed till the coming of the Meſſiah; now that the Jews were to be left to the guidance of their own reaſon, and the written inſtructions of their prophets—Malachi exhorts them to remember the law of Moſes, which the Lord had revealed from Horeb for the ſake of all Iſrael. At length he ſeals up the prophecies of the Old Teſtament, by predicting the commencement of the new diſpenſation, which ſhould be uſhered in by John the Baptiſt with the power and ſpirit of Elijah; who ſhould turn the hearts of fathers and children to repentance; but if his admonitions ſhould be rejected, that the Lord would ſmite the land with a curſe.

82 New Teſtament.

THE collection of writings compoſed after the aſcenſion of Chriſt, and acknowledged by his followers to be divine, is known in general by the name of καινη διαθηκη. This title, though neither given by divine command, nor applied to theſe writings by the apoſtles, was adopted in a very early age, though the preciſe time of its introduction is uncertain, it being juſtified by ſeveral paſſages in Scripture †, and warranted by the authority of St Paul in particular, who calls the ſacred books before the time of Chriſt παλαια διαθηκη ‡. Even long before that period, either the whole of the Old Teſtament, or the five books of Moſes, were entitled βιβλιον διαθηκης, or book of the covenant §.

83 Title.

† Matth. xxvi. 28. Gal. iii. 17. Heb. viii. 9. ix. 15—20. 1 2 Cor. iii.

‡ 1 Mac. i. 57.

As the word διαθηκη admits of a two-fold interpretation, we may tranſlate this title either the *New Covenant* or *New Teſtament*. The former tranſlation muſt be adopted, if reſpect be had to the texts of Scripture, from which the name is borrowed, ſince thoſe paſſages evidently convey the idea of a covenant; and, beſides, a being incapable of death can neither have made an old nor make a new teſtament. It is likewiſe probable, that the earlieſt Greek diſciples, who made uſe of this expreſſion, had no other notion in view than that of covenant

(R) מלאכי *Malachi* ſignifies properly *my angel*.

Scripture.

venant. We, on the contrary, are accuſtomed to give this ſacred collection the name of *Teſtament;* and ſince it would be not only improper, but even abſurd, to ſpeak of the Teſtament of God, we commonly underſtand the Teſtament of Chriſt; an explanation which removes but half the difficulty, ſince the new only, and not the old, had Chriſt for its teſtator.

84 Importance of the argument from the authenticity of the books.

In ſtating the evidence for the truth of Chriſtianity, there is nothing more worthy of conſideration than the authenticity of the books of the New Teſtament. This is the foundation on which all other arguments reſt; and if it is ſolid, the Chriſtian religion is fully eſtabliſhed. The proofs for the authenticity of the New Teſtament have this peculiar advantage, that they are plain and ſimple, and involve no metaphyſical ſubtilties.—Every man who can diſtinguiſh truth from falſehood muſt ſee their force; and if there are any ſo blinded by prejudice, or corrupted by licentiouſneſs, as to attempt by ſophiſtry to elude them, their ſophiſtry will be eaſily detected by every man of common underſtanding, who has read the hiſtorical evidence with candour and attention. Inſtead, therefore, of declaiming againſt the infidel, we ſolicit his attention to this ſubject, convinced, that where truth reſides, it will ſhine with ſo conſtant and clear a light, that the combined ingenuity of all the deiſts ſince the beginning of the world will never be able to extinguiſh or to obſcure it. If the books of the New Teſtament are really genuine, oppoſition will incite the Chriſtian to bring forward the evidence; and thus by the united efforts of the deiſt and the Chriſtian, the arguments will be ſtated with all the clearneſs and accuracy of which they are ſuſceptible in ſo remarkable a degree.

It is ſurpriſing that the adverſaries of Chriſtianity have not always made their firſt attacks in this quarter; for if they admit that the writings of the New Teſtament are as ancient as we affirm, and compoſed by the perſons to whom they are aſcribed, they muſt allow, if they reaſon fairly, that the Chriſtian religion is true.

The apoſtles frequently allude in their epiſtles to the gift of miracles, which they had communicated to the Chriſtian converts by the impoſition of hands, in confirmation of the doctrine delivered in their ſpeeches and writings, and ſometimes to miracles which they themſelves had performed. Now if theſe epiſtles are really genuine, it is hardly poſſible to deny thoſe miracles to be true. The caſe is here entirely different from that of an hiſtorian, who relates extraordinary events in the courſe of his narrative, ſince either credulity or an actual intention to deceive may induce him to deſcribe as true a ſeries of falſehoods reſpecting a foreign land or diſtant period. Even to the Evangeliſts might an adverſary of the Chriſtian religion make this objection: but to write to perſons with whom we ſtand in the neareſt connection, "I have not only performed miracles in your preſence, but have likewiſe communicated to you the ſame extraordinary endowments," to write in this manner, if nothing of the kind had ever happened, would require ſuch an incredible degree of effrontery, that he who poſſeſſed it would not only expoſe himſelf to the utmoſt ridicule, but by giving his adverſaries the faireſt opportunity to detect his impoſture, would ruin the cauſe which he attempted to ſupport.

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St Paul's Firſt Epiſtle to the Theſſalonians is addreſſed to a community to which he had preached the goſpel only three Sabbath days, when he was forced to quit it by the perſecution of the populace. In this epiſtle he appeals to the miracles which he had performed, and to the gifts of the Holy Spirit which he had communicated. Now, is it poſſible, without forfeiting all pretenſions to common ſenſe, that, in writing to a community which he had lately eſtabliſhed, he could ſpeak of miracles performed, and gifts of the Holy Ghoſt communicated, if no member of the ſociety had ſeen the one, or received the other?

To ſuppoſe that an impoſtor could write to the converts or adverſaries of the new religion ſuch epiſtles as theſe, with a degree of triumph over his opponents, and yet maintain his authority, implies ignorance and ſtupidity hardly to be believed. Credulous as the Chriſtians have been in later ages, and even ſo early as the third century, no leſs ſevere were they in their inquiries, and guarded againſt deception, at the introduction of Chriſtianity. This character is given them even by Lucian, a writer of the ſecond century, who vented his ſatire not only againſt certain Chriſtians *, who had ſupplied Peregrinus with the means of ſubſiſtence, but alſo againſt heathen oracles and pretended wonders. He relates of his impoſtor (Pſeudomantis), that he attempted nothing ſupernatural in the preſence of the Chriſtians and Epicureans. This Pſeudomantis exclaims before the whole aſſembly, "Away with the Chriſtians, away with the Epicureans, and let thoſe only remain who believe in the Deity!" (πιστευοντες τῳ Θεῳ) on which the populace took up ſtones to drive away the ſuſpicious; while the other philoſophers, Pythagoreans, Platoniſts, and Stoics, as credulous friends and protectors of the cauſe, were permitted to remain †.

* *De morte Peregrini,* § 12, 13, 16. *Ed. Reitz.* tom. iii. p. 334—338. 341.

† *Alexander ſeu Pſeudomantis,* § 25. 32. tom. ii. p. 232, 233. 244, 245.

It is readily acknowledged, that the arguments drawn from the authenticity of the New Teſtament only eſtabliſh the truth of the miracles performed by the apoſtles, and are not applicable to the miracles of our Saviour; yet, if we admit the firſt three goſpels to be genuine, the truth of the Chriſtian religion will be proved from the prophecies of Jeſus. For if theſe goſpels were compoſed by Matthew, Mark, and Luke, at the time in which all the primitive Chriſtians affirm, that is, previous to the deſtruction of Jeruſalem, they muſt be inſpired; for they contain a circumſtantial prophecy of the deſtruction of Jeruſalem, and determine the period at which it was accompliſhed. Now it was impoſſible that human ſagacity could foreſee that event; for when it was predicted nothing was more improbable. The Jews were reſolved to avoid an open rebellion, well knowing the greatneſs of their danger, and ſubmitted to the oppreſſions of their governors in the hope of obtaining redreſs from the court of Rome.—The circumſtance which gave birth to theſe misfortunes is ſo trifling in itſelf, that independent of its conſequences, it would not deſerve to be recorded. In the narrow entrance to a ſynagogue in Cæſarea, ſome perſon had made an offering of birds merely with a view to irritate the Jews. The inſult excited their indignation, and occaſioned the ſhedding of blood. Without this trifling accident, which no human wiſdom could foreſee even the day before it happened, it is poſſible that the prophecy of Jeſus would never have been fulfilled,

Scripture. fulfilled. But Florus, who was then procurator of Judea, converted this private quarrel into public hoſtilities, and compelled the Jewiſh nation to rebel contrary to its wiſh and reſolution, in order to avoid what the Jews had threatened, an impeachment before the Roman emperor for his exceſſive cruelties. But even after this rebellion had broken out, the deſtruction of the temple was a very improbable event. It was not the practice of the Romans to deſtroy the magnificent edifices of the nations which they ſubdued; and of all the Roman generals, none was more unlikely to demoliſh ſo ancient and auguſt a building as Titus Veſpaſian.

So important then is the queſtion, Whether the books of the New Teſtament be genuine? that the arguments which prove their authenticity, prove alſo the truth of the Chriſtian religion. Let us now conſider the evidence which proves the authenticity of the New Teſtament.

85 Their authenticity proved.

We receive the books of the New Teſtament as the genuine works of Matthew, Mark, Luke, John, and Paul, for the ſame reaſon that we receive the writings of Xenophon, of Polybius, of Plutarch, of Cæſar, and of Livy. We have the uninterrupted teſtimony of all ages, and we have no reaſon to ſuſpect impoſition. This argument is much ſtronger when applied to the books of the New Teſtament than when applied to any other writings; for they were addreſſed to large ſocieties, were often read in their preſence, and acknowledged by them to be the writings of the apoſtles.—Whereas, the moſt eminent profane writings which ſtill remain were addreſſed only to individuals, or to no perſons at all: and we have no authority to affirm that they were read in public; on the contrary, we know that a liberal education was uncommon; books were ſcarce, and the knowledge of them was confined to a few individuals in every nation.

The New Teſtament was read over three quarters of the world, while profane writers were limited to one nation or to one country. An uninterrupted ſucceſſion of writers from the apoſtolic ages to the preſent time quote the ſacred writings, or make alluſions to them: and theſe quotations and alluſions are made not only by friends but by enemies. This cannot be aſſerted of even the beſt claſſic authors. And it is highly probable, that the tranſlations of the New Teſtament were made ſo early as the ſecond century; and in a century or two after, they became very numerous. After this period, it was impoſſible to forge new writings, or to corrupt the ſacred text, unleſs we can ſuppoſe that men of different nations, of different ſentiments and different languages, and often exceedingly hoſtile to one another, ſhould all agree in one forgery. This argument is ſo ſtrong, that if we deny the authenticity of the New Teſtament, we may with a thouſand times more propriety reject all the other writings in the world: we may even throw aſide human teſtimony itſelf. But as this ſubject is of great importance, we ſhall conſider it at more length; and to enable our readers to judge with the greater accuracy, we ſhall ſtate, from the valuable work of Michaelis, as tranſlated by the judicious and learned Mr Marſh, the reaſons which may induce a critic to ſuſpect a work to be ſpurious.

86 Negatively.

1. When doubts have been made from its firſt appearance in the world, whether it proceeded from the author to whom it is aſcribed. 2. When the immediate friends of the pretended author, who were able to decide upon the ſubject, have denied it to be his production. 3. When a long ſeries of years has elapſed after his death, in which the book was unknown, and in which it muſt unavoidably have been mentioned and quoted, had it really exiſted. 4. When the ſtyle is different from that of his other writings, or, in caſe no other remain, different from that which might reaſonably be expected. 5. When events are recorded which happened later than the time of the pretended author. 6. When opinions are advanced which contradict thoſe he is known to maintain in his other writings. Though this latter argument alone leads to no poſitive concluſion, ſince every man is liable to change his opinion, or through forgetfulneſs to vary in the circumſtances of the ſame relation, of which Joſephus, in his Antiquities and War of the Jews, affords a ſtriking example. Scripture.

87 The reaſons that would prove a book to be ſpurious.

88 Do not apply to the New Teſtament.

1. But it cannot be ſhown that any one doubted of its authenticity in the period in which it firſt appeared. 2. No ancient accounts are on record whence we may conclude it to be ſpurious. 3. No conſiderable period elapſed after the death of the apoſtles, in which the New Teſtament was unknown; but, on the contrary, it is mentioned by their very contemporaries, and the accounts of it in the ſecond century are ſtill more numerous. 4. No argument can be brought in its disfavour from the nature of the ſtyle, it being exactly ſuch as might be expected from the apoſtles, not Attic but Jewiſh Greek. 5. No facts are recorded which happened after their death. 6. No doctrines are maintained which contradict the known tenets of the authors, ſince, beſide the New Teſtament, no writings of the apoſtles exiſt. But, to the honour of the New Teſtament be it ſpoken, it contains numerous contradictions to the tenets and doctrines of the fathers in the ſecond and third century, whoſe morality was different from that of the goſpel, which recommends fortitude and ſubmiſſion to unavoidable evils, but not that enthuſiaſtic ardour for martyrdom for which thoſe centuries are diſtinguiſhed; it alludes to ceremonies which in the following ages were either in diſuſe or totally unknown: all which circumſtances infallibly demonſtrate that the New Teſtament is not a production of either of thoſe centuries.

89 Poſitively.

We ſhall now conſider the poſitive evidence for the authenticity of the New Teſtament. Theſe may be arranged under the three following heads:

1. The impoſſibility of a forgery, ariſing from the nature of the thing itſelf. 2. The ancient Chriſtian, Jewiſh, and Heathen teſtimony in its favour. 3. Its own internal evidence.

90 Impoſſibility of a forgery ariſing from the nature of the thing

1. The impoſſibility of a forgery ariſing from the nature of the thing itſelf is evident. It is impoſſible to eſtabliſh forged writings as authentic in any place where there are perſons ſtrongly inclined and well qualified to detect the fraud. Now the Jews were the moſt violent enemies of Chriſtianity. They put the founder of it to death; they perſecuted his diſciples with implacable fury; and they were anxious to ſtifle the new religion in its birth. If the writings of the New Teſtament had been forged, would not the Jews have detected the impoſture? Is there a ſingle inſtance on record where a few individuals have impoſed a hiſtory upon the world againſt

Scripture. againſt the teſtimony of a whole nation? Would the inhabitants of Paleſtine have received the goſpels, if they had not had ſufficient evidence that Jeſus Chriſt really appeared among them, and performed the miracles aſcribed to him? Or would the churches of Rome or of Corinth have acknowledged the epiſtles addreſſed to them as the genuine works of Paul, if Paul had never preached among them? We might as well think to prove, that the hiſtory of the Reformation is the invention of hiſtorians; and that no revolution happened in Great Britain during the laſt century.

91 From teſtimony.

2. The ſecond kind of evidence which we produce to prove the authenticity of the New Teſtament, is the teſtimony of ancient writers, Chriſtians, Jews, and Heathens.

In reviewing the evidence of teſtimony, it will not be expected that we ſhould begin at the preſent age, and trace backwards the authors who have written on this ſubject to the firſt ages of Chriſtianity. This indeed, though a laborious taſk, could be performed in the moſt complete manner; the whole ſeries of authors, numerous in every age, who have quoted from the books of the New Teſtament, written commentaries upon them, tranſlated them into different languages, or who have drawn up a liſt of them, could be exhibited ſo as to form ſuch a perfect body of evidence, that we imagine even a jury of deiſts would find it impoſſible, upon a deliberate and candid examination, to reject or diſbelieve it. We do not, however, ſuppoſe that ſcepticiſm has yet arrived at ſo great a height as to render ſuch a tedious and circumſtantial evidence neceſſary. Paſſing over the intermediate ſpace, therefore, we ſhall aſcend at once to the fourth century, when the evidence for the authenticity of the New Teſtament was fully eſtabliſhed, and trace it back from that period to the age of the apoſtles. We hope that this method of ſtating the evidence will appear more natural, and will afford more ſatisfaction, than that which has been uſually adopted. Scripture.

It is ſurely more natural, when we inveſtigate the truth of any fact which depends on a ſeries of teſtimony, to begin with thoſe witneſſes who lived neareſt the preſent age, and whoſe characters are beſt eſtabliſhed. In this way we ſhall learn from themſelves the foundation of their belief, and the characters of thoſe from whom they derived it; and thus we aſcend till we arrive at its origin. This mode of inveſtigation will give more ſatisfaction to the deiſt than the uſual way; and we believe no Chriſtian, who is confident of the goodneſs of his cauſe, will be unwilling to grant any proper conceſſions. The deiſt will thus have an opportunity of examining, ſeparately, what he will conſider as the weakeſt parts of the evidence, thoſe which are exhibited by the earlieſt Chriſtian writers, conſiſting of expreſſions, and not quotations, taken from the New Teſtament. The Chriſtian, on the other hand, ought to wiſh, that theſe apparently weak parts of the evidence were diſtinctly examined, for they will afford an irrefragable proof that the New Teſtament was not forged: and ſhould the deiſt reject the evidence of thoſe early writers, it will be incumbent on him to account for the origin of the Chriſtian religion, which he will find more difficult than to admit the common hypotheſis.

In the fourth century we could produce the teſtimonies of numerous witneſſes to prove that the books of the New Teſtament exiſted at that time; but it will be ſufficient to mention their names, the time in which they wrote, and the ſubſtance of their evidence. This we ſhall preſent in a conciſe form in the following table, which is taken from Jones's New and Full Method of eſtabliſhing the canon of the New Teſtament.

The Names of the Writers.	*Times in which they lived.*	*The variation or agreement of their catalogues with ours now received.*	*The books in which theſe catalogues are.*
I. Athanaſius biſhop of Alexandria.	A. C. 315.	The ſame perfectly with ours now received.	*Fragment. Epiſt. Teſtal.* tom. ii. *in Synopſ.* tom. i.
II. Cyril biſhop of Jeruſalem.	340.	The ſame with ours, only the Revelation is omitted.	*Catech. IV.* § *ult.* p. 101.
III. The biſhops aſſembled in the council of Laodicea.	364.	The Revelation is omitted.	*Canon LIX.* N. B. The Canons of this council were not long afterwards received into the body of the canons of the univerſal church.
IV. Epiphanius biſhop of Salamis in Cyprus.	370,	The ſame with ours now received.	*Hæreſ. 76. cont. Anom.* p. 399.
V. Gregory Nazianzen biſhop of Conſtantinople.	375.	Omits the Revelation,	*Carm. de veris et genuin. Scriptur.*

Scripture.

The Names of the Writers.	*Times in which they lived.*	*The variation or agreement of their catalogues with ours now received.*	*The books in which these catalogues are.*
VI. Philaſtrius biſhop of Brixia in Venice.	380.	The ſame with ours now received; except that he mentions only 13 of St Paul's epiſtles (omitting very probably the Epiſtle to the Hebrews), and leaves out the Revelations.	*Lib. de Hæreſ. Numb.* 87.
VII. Jerome.	382.	The ſame with ours; except that he ſpeaks dubiouſly of the Epiſtle to the Hebrews; though in other parts of his writings he receives it as canonical.	*Ep. ad Paulin. Tract.* 6. p. 2. Alſo commonly prefixed to the Latin vulgar.
VIII. Ruffin preſbyter of Aquilegium.	390.	It perfectly agrees with ours.	*Expoſ. in Symb. Apoſtol.* § 36. *int. Ep. Hieron. Par.* 1. *Tract.* 3. p. 110. *et inter Op. Cypr.* p. 575.
IX. Auſtin biſhop of Hippo in Africa.	394.	It perfectly agrees with ours.	*De Doctrin. Chriſt.* lib. ii. c. 8. *Tom. Op.* 3. p. 25.
X. The XLIV biſhops aſſembled in the third council of Carthage.	St Auſtin was preſent at it.	It perfectly agrees with ours.	*Vid. Canon XLVII. et cap. ult.*

Scripture.

92 Teſtimonies of the ancient Chriſtians.

We now go back to Euſebius, who wrote about the year 315, and whoſe catalogue of the books of the New Teſtament we ſhall mention at more length. "Let us obſerve (ſays he) the writings of the apoſtle John, which are *uncontradicted;* and, firſt of all, muſt be mentioned, as acknowledged of all, the goſpel, according to him, well known to all the churches under heaven." The author then proceeds to relate the occaſions of writing the goſpels, and the reaſons for placing St John's the laſt, manifeſtly ſpeaking of all the four as equal in their authority, and in the certainty of their original. The ſecond paſſage is taken from a chapter, the title of which is, "Of the Scriptures univerſally acknowledged, and of thoſe that are not ſuch." Euſebius begins his enumeration in the following manner: "In the firſt place, are to be ranked the ſacred four Goſpels, then the book of the Acts of the Apoſtles; after that are to be reckoned the epiſtles of Paul: in the next place, that called the firſt Epiſtle of John and the Epiſtle of Peter are to be eſteemed authentic: after this is to be placed, if it be thought fit, the Revelation of John; about which we ſhall obſerve the different opinions at proper ſeaſons. Of the controverted, but yet well known or approved by the moſt, are that called the Epiſtle of James and that of Jude, the ſecond of Peter, and the ſecond and third of John, whether they were written by the evangeliſt or by another of the ſame name." He then proceeds to reckon up five others, not in our canon, which he calls in one place *ſpurious*, in another *controverted;* evidently meaning the ſame thing by theſe two words (s).

Paley's Evidences of Chriſtianity.

93 Of Euſebius.

94 Of Victorin.

A. D. 290, Victorin biſhop of Pettaw in Germany, in a commentary upon this text of the Revelation, "The firſt was like a lion, the ſecond was like a calf, the third like a man, and the fourth like a flying eagle," makes out, that by the four creatures are intended the four goſpels; and to ſhow the propriety of the ſymbols, he recites the ſubject with which each evangeliſt opens his hiſtory. The explication is fanciful, but the teſtimony poſitive. He alſo expreſsly cites the Acts of the Apoſtles.

95 Of Cyprian.

A. D. 230, Cyprian biſhop of Carthage gives the following teſtimony: "The church (ſays this father) is watered like Paradiſe by four rivers, that is, by four goſpels." The Acts of the Apoſtles are alſo frequently quoted by Cyprian under that name, and under the name of the *Divine Scriptures.*" In his various writings are ſuch frequent and copious citations of Scripture, as to place this part of the teſtimony beyond controverſy. Nor is there, in the works of this eminent African biſhop, one quotation of a ſpurious or apocryphal Chriſtian writing."

96 Of Origen.

A. D. 210, Origen is a moſt important evidence. Nothing can be more peremptory upon the ſubject now

(s) That Euſebius could not intend, by the word rendered *ſpurious*, what we at preſent mean by it, is evident from a clauſe in this very chapter, where, ſpeaking of the Goſpels of Peter and Thomas, and Matthias and ſome others, he ſays, "They are not ſo much as to be reckoned among the *ſpurious*, but are to be rejected as altogether abſurd and impious." *Lard. Cred.* vol. viii. p. 98.

Scripture. under conſideration, and, from a writer of his learning and information, nothing more ſatisfactory, than the declaration of Origen, preſerved in an extract of his works by Euſebius: "That the four goſpels alone are received without diſpute by the whole church of God under heaven:" to which declaration is immediately ſubjoined a brief hiſtory of the reſpective authors, to whom they were then, as they are now, aſcribed. The ſentiments expreſſed concerning the goſpels in all the works of Origen which remain, entirely correſpond with the teſtimony here cited. His atteſtation to the Acts of the Apoſtles is no leſs poſitive: "And Luke alſo once more ſounds the trumpet relating the Acts of the Apoſtles." That the Scriptures were then univerſally read, is plainly affirmed by this writer in a paſſage in which he is repelling the objections of Celſus, "That it is not in private books, or ſuch as are read by few only, and thoſe ſtudious perſons, but in books read by every body, that it is written, The inviſible things of God from the creation of the world are clearly ſeen, being underſtood by things that are made." It is to no purpoſe to ſingle out quotations of Scripture from ſuch a writer as this. We might as well make a ſelection of the quotations of Scripture in Dr Clarke's ſermons. They are ſo thickly ſown in the works of Origen, that Dr Mill ſays, "If we had all his works remaining, we ſhould have before us almoſt the whole text of the Bible."

97 Of Tertullian. A. D. 194, Tertullian exhibits the number of the goſpels then received, the names of the evangeliſts, and their proper deſignations, in one ſhort ſentence.—"Among the apoſtles, John and Matthew teach us the faith; among apoſtolical men, Luke and Mark refreſh it." The next paſſage to be taken from Tertullian affords as complete an atteſtation to the authenticity of the goſpels as can be well imagined. After enumerating the churches which had been founded by Paul at Corinth, in Galatia, at Philippi, Theſſalonica, and Epheſus, the church of Rome eſtabliſhed by Peter and Paul, and other churches derived from John, he proceeds thus: "I ſay then, that with them, but not with them only which are apoſtolical, but with all who have fellowſhip with them in the ſame faith, is that goſpel of Luke received from its firſt publication, which we ſo zealouſly maintain;" and preſently afterwards adds, "The ſame authority of the apoſtolical churches will ſupport the other goſpels, which we have from them, and according to them, I mean John's and Matthew's, although that likewiſe which Mark publiſhed may be ſaid to be Peter's, whoſe interpreter Mark was." In another place Tertullian affirms, that the three other goſpels, as well as St Luke's, were in the hands of the churches from the beginning. This noble teſtimony proves inconteſtably the antiquity of the goſpels, and that they were univerſally received; that they were in the hands of all, and had been ſo from the firſt. And this evidence appears not more than 150 years after the publication of the books. Dr Lardner obſerves, "that there are more and larger quotations of the ſmall volume of the New Teſtament in this one Chriſtian author, than there are of all the works of Cicero, in writers of all characters, for ſeveral ages."

98 Of Irenæus. A. D. 178, Irenæus was biſhop of Lyons, and is mentioned by Tertullian, Euſebius, Jerome, and Photius. In his youth he had been a diſciple of Polycarp, who was a diſciple of John. He aſſerts of himſelf and his contemporaries, that they were able to reckon up in all the principal churches the ſucceſſion of biſhops to their firſt inſtitution. His teſtimony to the four goſpels and Acts of the Apoſtles is expreſs and poſitive. "We have not received," ſays Irenæus, "the knowledge of the way of our ſalvation by any others than thoſe by whom the goſpel has been brought to us. Which goſpel they firſt preached, and afterwards by the will of God, committed to writing, that it might be for time to come the foundation and pillar of our faith. For after that our Lord roſe from the dead, and they (the apoſtles) were endowed from above with the power of the Holy Ghoſt coming down upon them, they received a perfect knowledge of all things. They then went forth to all the ends of the earth, declaring to men the bleſſing of heavenly peace, having all of them, and every one alike, the goſpel of God. Matthew then, among the Jews, wrote a goſpel in their own language, while Peter and Paul were preaching the goſpel at Rome, and founding a church there. And after their exit, Mark alſo, the diſciple and interpreter of Peter, delivered to us in writing the things that had been preached by Peter. And Luke, the companion of Paul, put down in a book the goſpel preached by him (Paul). Afterwards John, the diſciple of the Lord, who alſo leaned upon his breaſt, likewiſe publiſhed a goſpel while he dwelt at Epheſus in Aſia." Irenæus then relates how Matthew begins his goſpel, how Mark begins and ends his, and gives the ſuppoſed reaſons for doing ſo. He enumerates at length all the paſſages of Chriſt's hiſtory in Luke, which are not found in any of the other evangeliſts. He ſtates the particular deſign with which St John compoſed his goſpel, and accounts for the doctrinal declarations which precede the narrative. If any modern divine ſhould write a book upon the genuineneſs of the goſpels, he could not aſſert it more expreſsly, or ſtate their original more diſtinctly, than Irenæus hath done within little more than 100 years after they were publiſhed.

Scripture. Reſpecting the book of the Acts of the Apoſtles, and its author, the teſtimony of Irenæus is no leſs explicit. Referring to the account of St Paul's converſion and vocation, in the ninth chapter of that book, "Nor can they (ſays he, meaning the parties with whom he argues) ſhow that he is not to be credited, who has related to us the truth with the greateſt exactneſs." In another place, he has actually collected the ſeveral texts, in which the writer of the hiſtory is repreſented as accompanying St Paul, which led him to exhibit a ſummary of almoſt the whole of the laſt twelve chapters of the book.

According to Lardner, Irenæus quotes twelve of Paul's epiſtles, naming their author; alſo the firſt epiſtle of Peter, the two firſt epiſtles of John, and the Revelation. The epiſtles of Paul which he omits are thoſe addreſſed to Philemon and the Hebrews. Euſebius ſays, that he quotes the epiſtle to the Hebrews, though he does not aſcribe it to Paul. The work, however, is loſt.

99 Of Tatian. A. D. 172, Tatian, who is ſpoken of by Clemens Alexandrinus, Origen, Euſebius, and Jerome, compoſed a harmony of the four goſpels, which he called *Diateſſaron* of the four. This title, as well as the work, is remarkable,

Scripture. markable, becauſe it ſhows that then as well as now there were four, and only four, goſpels in general uſe among Chriſtians.

A. D. 170, the churches of Lyons and Vienne in France ſent an account of the ſufferings of their martyrs to the churches of Aſia and Phrygia, which has been preſerved entire by Euſebius. And what carries in ſome meaſure the teſtimony of theſe churches to a higher age is, that they had now for their biſhop Pothinus, who was 90 years old, and whoſe early life conſequently muſt have immediately followed the times of the apoſtles. In this epiſtle are exact references to the goſpels of Luke and John, and to the Acts of the Apoſtles. The form of reference is the ſame as in all the preceding articles. That from St John is in theſe words: "Then was fulfilled that which was ſpoken by the Lord, that whoſoever killeth you, will think that he doth God ſervice *."

* John xvi. 2.

Diſtinct references are alſo made to other books, viz. Acts, Romans, Epheſians, Philippians, 1 Timothy, 1 Peter, 1 John, Revelation.

100 Of Juſtin Martyr.

A. D. 140, Juſtin Martyr compoſed ſeveral books, which are mentioned by his diſciple Tatian, by Tertullian, Methodius, Euſebius, Jerome, Epiphanius, and Photius. In his writings between 20 and 30 quotations from the goſpels and Acts of the Apoſtles are reckoned up, which are clear, diſtinct, and copious; if each verſe be counted ſeparately, a much greater number; if each expreſſion, ſtill more. Jones, in his book on the Canon of the New Teſtament, ventures to affirm that he cites the books of which it conſiſts, particularly the four goſpels, above 200 times.

We meet with quotations of three of the goſpels within the compaſs of half a page; "and in other words, he ſays, Depart from me into outer darkneſs, which the Father hath prepared for Satan and his Angels," (which is from Matthew xxv. 41.). "And again he ſaid in other words, I give unto you power to tread upon ſerpents and ſcorpions, and venomous beaſts, and upon all the power of the enemy." (This from Luke x. 19.). "And, before he was crucified, he ſaid, The ſon of man muſt ſuffer many things, and be rejected of the Scribes and Phariſees, and be crucified, and riſe again the third day." (This from Mark viii. 31.).

All the references in Juſtin are made without mentioning the author; which proves that theſe books were perfectly well known, and that there were no other accounts of Chriſt then extant, or, at leaſt, no others ſo received and credited as to make it neceſſary to add any marks of diſtinction. But although Juſtin mentions not the authors names, he calls the books *Memoirs compoſed by the Apoſtles; Memoirs compoſed by the Apoſtles and their Companions;* which deſcriptions, the latter eſpecially, exactly ſuit the titles which the Goſpels and Acts of the Apoſtles now bear.

He informs us, in his firſt apology, that *the Memoirs of the Apoſtles*, or the writings of the prophets, are read according as the time allows; and, when the reader has ended, the preſident makes a diſcourſe, exhorting to the imitation of ſuch excellent things.

A few ſhort obſervations will ſhow the value of this teſtimony. 1. The Memoirs of the Apoſtles, Juſtin in another place expreſsly tells us are what are called *goſpels*. And that they were the goſpels which we now uſe is made certain by Juſtin's numerous quotations of them, and his ſilence about any others. 2. He deſcribes the general uſage of the Chriſtian church. 3. He does not ſpeak of it as recent or newly inſtituted, but in the terms in which men ſpeak of eſtabliſhed cuſtoms. Scripture.

Juſtin alſo makes ſuch alluſions to the following books as ſhews that he had read them: Romans, 1 Corinthians, Galatians, Epheſians, Philippians, Coloſſians, 2 Theſſalonians, Hebrews, 2 Peter; and he aſcribes the Revelation to John the Apoſtle of Chriſt.

101 Of Papias.

A. D. 116, Papias, a hearer of John, and companion of Polycarp, as Irenæus atteſts, and of the apoſtolical age as all agree, in a paſſage quoted by Euſebius, from a work now loſt, expreſsly aſcribes the two firſt goſpels to Matthew and Mark; and in a manner which proves that theſe goſpels muſt have publicly borne the names of theſe authors at that time, and probably long before; for Papias does not ſay, that one goſpel was written by Matthew, and another by Mark; but, aſſuming this as perfectly well known, he tells us from what materials Mark collected his account, viz. from Peter's preaching, and in what language Matthew wrote, viz. in Hebrew. Whether Papias was well informed in this ſtatement or not, to the point for which this teſtimony is produced, namely, that theſe books bore theſe names at this time, his authority is complete.

Papias himſelf declares that he received his accounts of Chriſtianity from thoſe who were acquainted with the apoſtles, and that thoſe accounts which he thus received from the older Chriſtians, and had committed to memory, he inſerted in his books. He farther adds, that he was very ſolicitous to obtain every poſſible information, eſpecially to learn what the apoſtles ſaid and preached, valuing ſuch information more than what was written in books *.

* *Præfat. in Op. apud. Euſeb. Hiſt. Eccl.* lib. iii. c. 39.

102 Of Polycarp.

A. D. 108, Polycarp was the biſhop of Smyrna, and diſciple of John the Apoſtle. This teſtimony concerning Polycarp is given by Irenæus, who in his youth had ſeen him. "I can tell the place," ſaith Irenæus, "in which the bleſſed Polycarp ſat and taught, and his going out and coming in, and the manner of his life, and the form of his perſon, and the diſcourſes he made to the people, and how he related his converſation with John and others who had ſeen the Lord, and how he related their ſayings, and what he had heard concerning the Lord, both concerning his miracles and his doctrine, as he had received them from the eye-witneſſes of the word of life; all which Polycarp related agreeable to the ſcriptures."

Of Polycarp, whoſe proximity to the age and country and perſons of the apoſtles is thus atteſted, we have one undoubted epiſtle remaining; which, though a ſhort performance, contains nearly 40 clear alluſions to the books of the New Teſtament. This is ſtrong evidence of the reſpect which was paid to them by Chriſtians of that age. Amongſt theſe, although the writings of St Paul are more frequently uſed by Polycarp than other parts of ſcripture, there are copious alluſions to the goſpel of St Matthew, ſome to paſſages found in the goſpels both of Matthew and Luke, and ſome which more nearly reſemble the words in Luke.

He thus fixes the authority of the Lord's Prayer, and the uſe of it among Chriſtians. If, therefore, we pray the-

Scripture. the Lord to *forgive us, we ought alſo to forgive.* And again, With ſupplication *beſeeching* the all-ſeeing God *not to lead us into temptation.*

In another place, he quotes the words of our Lord: "But remembering what the Lord ſaid, teaching, Judge not, that ye be not judged. Forgive, and ye ſhall be forgiven; be ye merciful, that ye may obtain mercy; with what meaſure ye mete, it ſhall be meaſured to you again *. Suppoſing Polycarp to have had theſe words from the books in which we now find them, it is manifeſt that theſe books were conſidered by him, and by his readers, as he thought, as authentic accounts of Chriſt's diſcourſes; and that this point was inconteſtable.

* Mat. viii. 1. i. 2. v. 7.

He quotes alſo the following books, the firſt of which he aſcribes to St Paul: 1 Corinthians, Epheſians, Philippians, 1 and 2 Theſſalonians; and makes evident references to others, particularly to Acts, Romans, 2 Corinthians, Galatians, 1 Timothy, 2 Timothy, 1 Peter, 1 John.

103 Of Ignatius.

Ignatius, as it is teſtified by ancient Chriſtian writers, became biſhop of Antioch about 37 years after Chriſt's aſcenſion; and therefore, from his time, and place, and ſtation, it is probable that he had known and converſed with many of the apoſtles. Epiſtles of Ignatius are referred to by Polycarp his contemporary. Paſſages, found in the epiſtles now extant under his name, are quoted by Irenæus, A. D. 178, by Origen, A. D. 230; and the occaſion of writing them is fully explained by Euſebius and Jerome. What are called the ſmaller epiſtles of Ignatius are generally reckoned the ſame which were read by Irenæus, Origen, and Euſebius.

They are admitted as genuine by Voſſius, and have been proved to be ſo by Biſhop Pearſon with a force of argument which ſeems to admit of no reply. In theſe epiſtles are undoubted alluſions to Matt. iii. 15. xi. 16. to John iii. 8.; and their venerable author, who often ſpeaks of St Paul in terms of the higheſt reſpect, once quotes his epiſtle to the Epheſians by *name*.

104 Of Hermas.

Near the concluſion of the epiſtle to the Romans, St Paul, amongſt others, ſends the following ſalutation: —"Salute Aſyncritus, Phlegon, *Hermas*, Patrobus, Hermes, and the brethren which are with them." Of Hermas, who appears in this catalogue of Roman Chriſtians as contemporary with St Paul, there is a book ſtill remaining, the authenticity of which cannot be diſputed. It is called the *Shepherd*, or *Paſtor of Hermas*. Its antiquity is inconteſtable, from the quotations of it in Irenæus, A. D. 178, Clement of Alexandria, A. D. 194, Tertullian, A. D. 200, Origen, A. D. 230. The notes of time extant in the epiſtle itſelf agree with its title, and with the teſtimonies concerning it, which intimate that it was written during the lifetime of Clement. In this piece are tacit alluſions to St Matthew's, St Luke's, and St John's goſpels; that is to ſay, there are applications of thoughts and expreſſions found in theſe goſpels, without citing the place or writer from which they were taken. In this form appear in Hermas the confeſſing and denying of Chriſt †; the parable of the ſeed ſown; ‡ the compariſon of Chriſt's diſciples to little children; the ſaying, "he that putteth away his wife, and marrieth another, committeth adultery §;" the ſingular expreſſion, "having received all power from his Father," is probably an alluſion to Matt. xxviii. 18. and Chriſt being the "gate," or only way of coming "to God," is a plain alluſion to John xiv. 6. x. 7. 9. There is alſo a probable alluſion to Acts v. 32.

Scripture.

† Matt. x. 32, 33, or Luke xii. 8, 9.
‡ Matt. xiii. 3, or Luke viii. 5.
§ Luke xvi. 18.

The Shepherd of Hermas has been conſidered as a fanciful performance. This, however, is of no importance in the preſent caſe. We only adduce it as evidence that the books to which it frequently alludes exiſted in the firſt century; and for this purpoſe it is ſatisfactory, as its authenticity has never been queſtioned. However abſurd opinions a man may entertain while he retains his underſtanding, his teſtimony to a matter of fact will ſtill be received in any court of juſtice.

105 Of Clemens Romanus.

A. D. 96, we are in poſſeſſion of an epiſtle written by Clement biſhop of Rome, whom ancient writers, without any ſcruple, aſſert to have been the Clement whom St Paul mentions Philippians iv. 3. "with Clement alſo, and other my fellow labourers, whoſe names are in the book of life." This epiſtle is ſpoken of by the ancients as an epiſtle acknowledged by all; and, as Irenæus well repreſents its value, "written by Clement, who had ſeen the bleſſed apoſtles and converſed with them, who had the preaching of the apoſtles ſtill ſounding in his ears, and their traditions before his eyes." It is addreſſed to the church of Corinth; and what alone may ſeem a deciſive proof of its authenticity, Dionyſius biſhop of Corinth, about the year 170, i. e. about 80 or 90 years after the epiſtle was written, bears witneſs, "that it had been uſually read in that church from ancient times." This epiſtle affords, amongſt others, the following valuable paſſages: "Eſpecially remembering the words of the Lord Jeſus, which he ſpake, teaching gentleneſs and long ſuffering; for thus he ſaid (T), Be ye merciful, that ye may obtain mercy; forgive, that it may be forgiven unto you; as you do, ſo ſhall it be done unto you; as you give, ſo ſhall it be given unto you; as ye judge, ſo ſhall ye be judged; as ye ſhew kindneſs, ſo ſhall kindneſs be ſhewn unto you; with what meaſure ye mete, with the ſame it ſhall be meaſured to you. By this command, and by theſe rules, let us eſtabliſh ourſelves, that we may always walk obediently to his holy words."

Again, "Remember the words of the Lord Jeſus, for he ſaid, Wo to that man by whom offences come; it were better for him that he had not been born, than that he ſhould offend one of my elect; it were better for him that a millſtone ſhould be tied about his neck, and that he ſhould be drowned in the ſea, than that he ſhould offend one of my little ones (U)."

He

(T) "Bleſſed are the merciful, for they ſhall obtain mercy," Matt. v. 7. "Forgive, and ye ſhall be forgiven; give, and it ſhall be given unto you," Luke vi. 37, 38. "Judge not, that ye be not judged; for with what judgement ye judge, ye ſhall be judged, and with what meaſure ye mete, it ſhall be meaſured to you again," Matt. vii. 2.

(U) Matt. xviii. 6. "But whoſo ſhall offend one of theſe little ones which believe in me, it were better for him that a millſtone were hanged about his neck, and that he were caſt into the ſea." The latter part of the paſſage in

Scripture.

He aſcribes the firſt epiſtle to the Corinthians to Paul, and makes ſuch alluſions to the following books as are ſufficient to ſhew that he had ſeen and read them: Acts, Romans, 2 Corinthians, Galatians, Epheſians, Philippians, Coloſſians, 1 Theſſalonians, 1 Timothy, 2 Timothy, Titus, 1 Peter, 2 Peter.

It may be ſaid, as Clement has not mentioned the books by name from which we aſſert theſe alluſions or references are made, it is uncertain whether he refers to any books, or whether he received theſe expreſſions from the diſcourſes and converſation of the apoſtles. Mr Paley has given a very ſatisfactory anſwer to this objection: 1ſt, That Clement, in the very ſame manner, namely, without any mark of reference, uſes a paſſage now found in the epiſtle to the Romans *; which paſſage, from the peculiarity of the words that compoſe it, and from their order, it is manifeſt that he muſt have taken from the epiſtle. The ſame remark may be applied to ſome very ſingular ſentiments in the epiſtle to the Hebrews. Secondly, That there are many ſentences of St Paul's firſt epiſtle to the Corinthians, to be found in Clement's epiſtle, without any ſign of quotation, which yet certainly are quotations; becauſe it appears that Clement had St Paul's epiſtle before him; for in one place he mentions it in terms too expreſs to leave us in any doubt. "Take into your hands the epiſtle of the bleſſed apoſtle Paul." Thirdly, That this method of adopting words of ſcripture, without reference or acknowledgement, was a method in general uſe amongſt the moſt ancient Chriſtian writers. Theſe analogies not only repel the objection, but caſt the preſumption on the other ſide; and afford a conſiderable degree of poſitive proof, that the words in queſtion have been borrowed from the places of ſcripture in which we now find them. But take it, if you will, the other way, that Clement had heard theſe words from the apoſtles or firſt teachers of Chriſtianity; with reſpect to the preciſe point of our argument, viz. that the ſcriptures contain what the apoſtles taught, this ſuppoſition may ſerve almoſt as well.

* Chap. i. 20.

We have now traced the evidence to the times of the apoſtles; but we have not been anxious to draw it out to a great length, by introducing every thing. On the contrary, we have been careful to render it as conciſe as poſſible, that its force might be diſcerned at a glance. The evidence which has been ſtated is of two kinds. Till the time of Juſtin Martyr and Irenæus it conſiſts chiefly of alluſions, references, and expreſſions, borrowed from the books of the New Teſtament, without mentioning them by name. After the time of Irenæus it became uſual to cite the ſacred books, and mention the authors from whom the citations were taken.

106 The alluſions and references to the New Teſtament by the firſt Chriſtian writers prove that it exiſted in their time.

The firſt ſpecies of evidence will perhaps appear to ſome exceptionable; but it muſt be remembered that it was uſual among the ancient Chriſtians as well as Jews to adopt the expreſſions of Scripture without naming the authors. Why they did ſo it is not neceſſary to inquire. The only point of importance to be determined is, whether thoſe references are a ſufficient proof of the exiſtence of the books to which they allude? This, we preſume, will not be denied; eſpecially in the preſent age, when it is ſo common to charg an author with plagiariſm if he happen to fall upon the ſame train of ideas, or expreſs himſelf in a ſimilar manner with authors who have written before him. We may farther affirm, that theſe tacit references afford a complete proof that thoſe ancient writers had no intention of impoſing a forgery upon the world. They prove the exiſtence of the Chriſtian religion and of the apoſtolical writings, without ſhowing any ſuſpicious earneſtneſs that men ſhould believe them. Had theſe books been forged, thoſe who wiſhed to paſs them upon the world would have been at more pains than the firſt Chriſtians were to prove their authenticity. They acted the part of honeſt men; they believed them themſelves, and they never imagined that others would ſuſpect their truth. Scripture.

It is a conſideration of great importance, in reviewing the evidence which has been now ſtated, that the witneſſes lived in different countries; Clemens flouriſhed at Rome, Polycarp at Smyrna, Juſtin Martyr in Syria, Irenæus in France, Tertullian at Carthage, Origen at Alexandria, and Euſebius at Cæſarea. This proves that the books of the New Teſtament were equally well known in diſtant countries by men who had no intercourſe with one another.

107 Teſtimonies of Heretics.

The ſame thing is proved by teſtimonies if poſſible leſs exceptionable. The ancient heretics, whoſe opinions were ſometimes groſſer and more impious than thoſe which any modern ſectary has ventured to broach, and whoſe zeal in the propagation of them equalled that of the moſt flaming enthuſiaſt of the laſt century, never called in queſtion the authenticity of the books of the New Teſtament. When they met with any paſſage in the goſpels or epiſtles which they could not reconcile to their own heretical notions, they either eraſed it, or denied that the author was inſpired; but they nowhere contend that the book in which it ſtood was not written by the apoſtle or evangeliſt whoſe name it bore. Euſebius relates, that the Ebionites rejected all the epiſtles of Paul, and called him an apoſtate, becauſe he departed from the Levitical law; and they adopted as their rule of faith the goſpel of St Matthew, though indeed they greatly corrupted it. This proves therefore that the goſpel according to Matthew was then publiſhed, and that St Paul's epiſtles were then known.

Of the heretics who eraſed or altered paſſages to make the Scriptures agree with their doctrines, we may produce Marcion as an inſtance, who lived in the beginning of the ſecond century. He lived in an age when he could have eaſily diſcovered if the writings of the New Teſtament had been forged; and as he was much incenſed againſt the orthodox party, if ſuch a forgery had been committed, unqueſtionably he would not have failed to make the diſcovery, as it would have afforded the moſt ample means of revenge and triumph, and enabled him to eſtabliſh his own opinions with leſs difficulty. But his whole conduct ſhows clearly, that he believed the writings of the New Teſtament to be authentic.

in Clement agrees more exactly with Luke xvii. 2. "It were better for him that a millſtone were hanged about his neck, and he caſt into the ſea, than that he ſhould offend one of theſe little ones."

Scripture. authentic. He ſaid, that the goſpel according to St Matthew, the epiſtle to the Hebrews, with thoſe of St Peter and St James, as well as the Old Teſtament in general, were writings not for Chriſtians but for Jews. He publiſhed a new edition of the goſpel according to Luke, and the firſt ten epiſtles of Paul; in which it has been affirmed by Epiphanius, that he altered every paſſage that contradicted his own opinions: but as many of theſe alterations are what modern critics call *various readings*, though we receive the teſtimony of Epiphanius, we muſt not rely upon his opinion (x). Hence it is evident that the books of the New Teſtament abovementioned did then exiſt, and were acknowledged to be the works of the authors whoſe names they bear.

Dr Lardner, in his General Review, ſums up this head of evidence in the following words: "Noetus, Paul of Samoſata, Sabellius, Marcellus, Photinus, the Novatians, Donatiſts, Manicheans (y), Priſcillianiſts, beſide Artemon, the Audians, the Arians, and divers others, all received moſt or all the ſame books of the New Teſtament which the Catholics received; and agreed in a like reſpect for them as writ by apoſtles or their diſciples and companions."

108 Teſtimonies of Heathens. Celſus and Porphyry, both enemies of the Chriſtian religion, are powerful witneſſes for the antiquity of the New Teſtament. Celſus, who lived towards the end of the ſecond century, not only mentions by name, but quotes paſſages from the books of the New Teſtament: and that the books to which he refers were no other than our preſent goſpels, is evident from the alluſions to various paſſages ſtill found in them. Celſus takes notice of the genealogies, which fixes two of theſe goſpels; of the precepts, Reſiſt not him that injures you, and, If a man ſtrike thee on the one cheek, offer to him the other alſo; of the woes denounced by Chriſt; of his predictions; of his ſaying, that it is impoſſible to ſerve two maſters; of the purple robe, the crown of thorns, and the reed which was put into the hand of Jeſus; of the blood that flowed from his body upon the croſs, a circumſtance which is recorded only by John; and (what is *inſtar omnium* for the purpoſe for which we produce it) of the difference in the accounts given of the reſurrection by the evangeliſts, ſome mentioning two angels at the ſepulchre, others only one.

109 Of Celſus. It is extremely material to remark, that Celſus not only perpetually referred to the accounts of Chriſt contained in the four goſpels, but that he referred to no other accounts; that he founded none of his objections to Chriſtianity on any thing delivered in ſpurious goſpels.

110 Of Porphyry. The teſtimony of Porphyry is ſtill more important than that of Celſus. He was born in the year 213, of Tyrian origin. Unfortunately for the preſent age, ſays Michaelis, the miſtaken zeal of the Chriſtian emperors has baniſhed his writings from the world; and every real friend of our religion would gladly give the works of one of the pious fathers to reſcue thoſe of Porphyry from the flames. But Mr Marſh, the learned and judicious tranſlator of Michaelis, relates, that, according to the accounts of Iſaac Voſſius, a manuſcript of the works of Porphyry is preſerved in the Medicean library at Florence, but kept ſo ſecret that no one is permitted to ſee it. It is univerſally allowed, that Porphyry is the moſt ſenſible, as well as the moſt ſevere, adverſary of the Chriſtian religion that antiquity can produce. He was verſed not only in hiſtory, but alſo in philoſophy and politics. His acquaintance with the Chriſtians was not confined to a ſingle country; for he had converſed with them in Tyre, in Sicily, and in Rome. Enabled by his birth to ſtudy the Syriac as well as the Greek authors, he was of all the adverſaries to the Chriſtian religion the beſt qualified to inquire into the authenticity of the ſacred writings. He poſſeſſed therefore every advantage which natural abilities or a ſcientific education could afford to diſcover whether the New Teſtament was a genuine work of the apoſtles and evangeliſts, or whether it was impoſed upon the world after the deceaſe of its pretended authors. But no trace of this ſuſpicion is anywhere to be found in his writings. In the fragments which ſtill remain, mention is made of the goſpels of St Matthew, St Mark, and St John, the Acts of the Apoſtles, and the epiſtle to the Galatians; and it clearly appears from the very objections of Porphyry, that the books to which he alludes were the ſame which we poſſeſs at preſent. Thus he objects to the repetition of a generation in St Matthew's genealogy; to Matthew's call; to the quotation of a text from Iſaiah, which is found in a pſalm aſcribed to Aſaph; to the calling of the lake of Tiberias a ſea; to the expreſſion in St Matthew, "the abomination of deſolation;" to the variation in Matthew and Mark upon the text "the voice of one crying in the wilderneſs," Matthew citing it from Iſaias, Mark from the prophets; to John's application of the term *Word;* to Chriſt's change of intention about going up to the feaſt of tabernacles (John vii. 8.); to the judgement denounced by St Peter upon Ananias and Sapphira, which he calls an imprecation of death.

The inſtances here alleged ſerve in ſome meaſure to ſhow the nature of Porphyry's objections, and prove that Porphyry had read the goſpels with that ſort of attention which a writer would employ who regarded them as the depoſitaries of the religion which he attacked. Beſide theſe ſpecifications, there exiſts in the writings of ancient Chriſtians general evidence, that the places of Scripture, upon which Porphyry had made remarks, were very numerous. Scripture.

111 Authenticity of the New Teſtament proved from internal evidence. The internal evidence to prove the authenticity of the New Teſtament conſiſts of two parts: The nature of the ſtyle, and the coincidence of the New Teſtament with the hiſtory of the times.

112 From the ſtyle. The ſtyle of the New Teſtament is ſingular, and differs very widely from the ſtyle of claſſical authors. It is full of Hebraiſms and Syriaſms; a circumſtance which pious ignorance has conſidered as a fault, and which, even ſo late as the preſent century, it has attempted to remove; not knowing that theſe very deviations from Grecian purity afford the ſtrongeſt preſumption in its favour: for they prove, *that the New Teſtament was written by men of Hebrew origin, and is therefore a production*

(x) Dr Loeffer has written a learned diſſertation to prove that Marcion did not corrupt the ſacred writings.
(y) This muſt be with an exception, however, of Fauſtus, who lived ſo late as the year 384.

Scripture. *duction of the firſt century.* After the death of the firſt Jewiſh converts, few of the Jews turned preachers of the goſpel; the Chriſtians were generally ignorant of Hebrew, and conſequently could not write in the ſtyle of the New Teſtament. After the deſtruction of Jeruſalem and the diſperſion of the Jews, their language muſt have been blended with that of other nations, and their vernacular phraſeology almoſt entirely loſt. The language of the early fathers, though not always the pureſt claſſic Greek, has no reſemblance to that of the New Teſtament, not even excepting the works of the few who had a knowledge of the Hebrew; as Origen, Epiphanius, and Juſtin Martyr, the laſt of whom being a native of Paleſtine, might have written in a ſtyle ſimilar to that of the New Teſtament, had ſuch a ſtyle then prevailed. He that ſuſpects the New Teſtament to be the forgery of a more recent period, ought to produce ſome perſon who has employed a ſimilar diction; but thoſe who are converſant with eaſtern writings know well that a foreigner, who has not been accuſtomed to eaſtern manners and modes of thinking from his infancy, can never imitate with ſucceſs the oriental ſtyle, much leſs forge a hiſtory or an epiſtle which contains a thouſand incidental alluſions, which nothing but truth could ſuggeſt. To imitate cloſely the ſtyle of the New Teſtament is even more difficult than to imitate that of any other oriental book; for there is not a ſingle author, even among the Jews themſelves, ſince the deſtruction of Jeruſalem, that has compoſed in a ſtyle in the leaſt degree like it (z).

But though the books of the New Teſtament bear ſo cloſe a reſemblance in idiom, there is a diverſity of ſtyle which ſhows them to be the work of different perſons. Whoever reads with attention the epiſtles of Paul, muſt be convinced that they were all written by the ſame author. An equal degree of ſimilarity is to be found between the goſpel and 1ſt epiſtle of John. The writings of St John and St Paul exhibit marks of an original genius which no imitation can ever attain. The character of Paul as a writer is drawn with great judgement by Michaelis: "His mind overflows with ſentiment, yet he never loſes ſight of his principal object, but hurried on by the rapidity of thought, diſcloſes frequently in the middle a concluſion to be made only at the end. To a profound knowledge of the Old Teſtament he joins the acuteneſs of philoſophical wiſdom, which he diſplays in applying and expounding the ſacred writings; and his explanations are therefore ſometimes ſo new and unexpected, that ſuperficial obſervers might be tempted to ſuppoſe them erroneous. The fire of his genius, and his inattention to ſtyle, occaſion frequently a twofold obſcurity, he being often too conciſe to be underſtood except by thoſe to whom he immediately wrote, and not ſeldom on the other hand ſo full of his ſubject, as to produce long and difficult parentheſes, and a repetition of the ſame word even in different ſenſes. With a talent for irony and ſatire, he unites the moſt refined ſenſibility, and tempers the ſeverity of his cenſures by expreſſions of tenderneſs and affection; nor does he ever forget in the vehemence of his zeal the rules of modeſty and decorum. He is a writer, in ſhort, of ſo ſingular and wonderful a compoſition, that it would be difficult to find a rival. That truly ſenſible and ſagacious philoſopher Locke was of the ſame opinion, and contended that St Paul was without an equal." Scripture.

Poems have been forged and aſcribed to former ages with ſome ſucceſs. Philoſophical treatiſes might be invented which it would be difficult to detect; but there is not a ſingle inſtance on record where an attempt has been made to forge a hiſtory or a long epiſtle, where the fraud has not been either fully proved, or rendered ſo ſuſpicious that few are weak enough to believe it. Whoever attempts to forge a hiſtory or an epiſtle in the name of an ancient author, will be in great danger of contradicting the hiſtory or the manners of that age, eſpecially if he relate events which are not mentioned in general hiſtory, but ſuch as refer to a ſingle city, ſect, religion, or ſchool.

The difficulty of forging ſuch hiſtories as the goſpels, and ſuch epiſtles as thoſe of Paul, cannot be overcome by all the genius, learning, and induſtry, of any individual or ſociety of men that ever lived. They contain a purer ſyſtem of ethics than all the ancient philoſophers could invent: They diſcover a candour and modeſty unexampled: They exhibit an originality in the character of Jeſus, and yet ſuch a conſiſtency as the imagination of our beſt poets has never reached. Now it is a very remarkable circumſtance, that hiſtories written by four different men ſhould preſerve ſuch dignity and conſiſtency, though frequently relating different actions of Jeſus, and deſcending to the moſt minute circumſtances in his life. The ſcene of action is too extenſive, and the agreement of facts with the ſtate of the times as repreſented by other hiſtorians is too cloſe, to admit the poſſibility of forgery.

The ſcene of action is not confined to one country, it is ſucceſſively laid in the greateſt cities of the Roman empire; in Rome, in Antioch, in Corinth, in Athens, as well as in Jeruſalem and the land of Paleſtine. Innumerable alluſions are made to the manners and opinions of the Greeks, the Romans, and the Jews; and reſpecting the Jews, they extend even to the trifles and follies of their ſchools. Yet after the ſtricteſt examination, the New Teſtament will be found to have a wonderful coincidence and harmony with Joſephus, the principal hiſtorian of theſe times, and an enemy of Chriſtianity.

113 And from the remarkable inſtances of coincidence between Joſephus and the New Teſtament.

It has been a queſtion who the ſoldiers were who are ſaid in the goſpel of Luke to have addreſſed John the Baptiſt in theſe words, *What ſhall we do?* An anſwer to this queſtion may be found in Joſephus *. Herod the tetrarch of Galilee was engaged in a war with his father-in-law Aretas, a petty king in Arabia Petræa, at the very time that John was preaching in the wilderneſs; and the road from Galilee to Arabia running through that wilderneſs, the ſoldiers on their march had this interview with the Baptiſt. A coincidence like this, which

* *Antiq.* lib. lviii. cap. 5. ſect. 1, 2.

(z) The ſtyle of Clemens Romanus may perhaps be an exception. By many eminent critics it has been thought ſo like to that of the epiſtle to the Hebrews, as to give room for the opinion that Clement either was the author of that epiſtle, or was the perſon who tranſlated it from the Syro-Chaldaic language, in which it was originally compoſed.

Scripture. which has been overlooked by all the commentators, would not probably be attended to in a forgery.

Chap. ii. § 11. Another inſtance of an agreement no leſs remarkable we ſhall quote from the valuable work of Michaelis. It has been a queſtion of ſome difficulty among the learned, who was the Ananias who commanded St Paul to be ſmitten on the mouth when he was making his defence before the council in Jeruſalem *. Krebs, in his remarks taken from Joſephus, has ſhown him to have been the ſon of Nebedeni. But if ſo, how can it be reconciled with chronology, that Ananias was, at that time, called high prieſt, when it is certain from Joſephus that the time of his holding that office was much earlier? And how comes it to paſs that St Paul ſays, "I wiſt not, brethren, that he was the high prieſt?" The ſacerdotal garb muſt have diſcovered who he was: a jeſt would have ill-ſuited the gravity of a tribunal; and a falſehood is inconſiſtent with the character of St Paul.

* Acts xxiii. 2—5.

All theſe difficulties vaniſh as ſoon as we examine the ſpecial hiſtory of that period: "Ananias the ſon of Nebedeni was high prieſt at the time that Helena queen of Adiabene ſupplied the Jews with corn from Egypt during the famine which took place in the fourth year of Claudius, mentioned in the eleventh chapter of the Acts. St Paul therefore, who took a journey to Jeruſalem at that period, could not have been ignorant of the elevation of Ananias to that dignity. Soon after the holding of the firſt council, as it is called, at Jeruſalem, Ananias was diſpoſſeſſed of his office, in conſequence of certain acts of violence between the Samaritans and the Jews, and ſent priſoner to Rome; but being afterwards releaſed, he returned to Jeruſalem. Now from that period he could not be called *high-prieſt* in the proper ſenſe of the word, though Joſephus has ſometimes given him the title of ἀρχιερεύς, taken in the more extenſive meaning of a prieſt who had a ſeat and voice in the Sanhedrim; and Jonathan, though we are not acquainted with the circumſtances of his elevation, had been raiſed in the mean time to the ſupreme dignity in the Jewiſh church. Between the death of Jonathan, who was murdered by order of Felix, and the high-prieſthood of Iſmael, who was inveſted with that dignity by Agrippa, elapſed an interval during which the ſacerdotal office was vacant. Now it happened preciſely in this interval that St Paul was apprehended in Jeruſalem: and, the Sanhedrim being deſtitute of a preſident, he undertook of his own authority the diſcharge of that office, which he executed with the greateſt tyranny. It is poſſible therefore that St Paul, who had been only a few days in Jeruſalem, might be ignorant that Ananias, who had been diſpoſſeſſed of the prieſthood, had taken upon himſelf a truſt to which he was not entitled; he might therefore very naturally exclaim, 'I wiſt not, brethren, that he was the high-prieſt!' Admitting him on the other hand to have been acquainted with the fact, the expreſſion muſt be conſidered as an indirect reproof, and a tacit refuſal to recognize uſurped authority."

Could ſuch a correſpondence as this ſubſiſt between truth and falſehood, between a forgery and an authentic hiſtory? or is it credible that theſe events could be related by any perſon but a contemporary?

Impreſſed with the love of truth, and feeling contempt as well as deteſtation at pious frauds, we heſitate not to acknowledge, that in ſome particular facts there is a difference either real or apparent between Joſephus and the writers of the New Teſtament. The objections ariſing from theſe differences are of two kinds: 1. Such as would prove a book not to have been written by the author to whom it is aſcribed. 2. Such as would prove that the author was miſtaken, and therefore not divinely inſpired. To the firſt claſs belongs the following objection: St Paul ſays (2 Cor. xi. 32.) that the governor of Damaſcus was under Aretas the king: but if we are to judge from the 18th book of the Jewiſh Antiquities, which correſponds with the period of St Paul's journey to Damaſcus, that city muſt have belonged at that time to the Romans; and what authority could Aretas, a petty king in Arabia Petræa, have in ſuch a city? In anſwer to this queſtion, J. G. Hyne, in a diſſertation publiſhed in 1755, has ſhown it to be highly probable that Aretas, againſt whom the Romans, not long before the death of Tiberius, made a declaration of war, which they neglected to put in execution, took the opportunity of ſeizing Damaſcus, which had once belonged to his anceſtors; an event omitted by Joſephus, as forming no part of the Jewiſh hiſtory, and by the Roman hiſtorians as being a matter not flattering in itſelf, and belonging only to a diſtant province. Secondly, That Aretas was by religion a Jew; a circumſtance the more credible, when we reflect that Judaiſm had been widely propagated in that country, and that even kings in Arabia Felix had recognized the law of Moſes. The difficulty then is ſo far removed, that it ceaſes to create ſuſpicion againſt an epiſtle which has ſo many evident marks of authenticity; and it is only to be regretted that, in order to place the ſubject in the cleareſt point of view, we are not ſufficiently acquainted with the particular hiſtory of Damaſcus.

Scripture. 114 There are alſo apparent inconſiſtencies, but theſe probably ariſe from overſight in Joſephus;

Examples of the ſecond kind are ſuch as, if allowed their full force, might indeed prove a writer not divinely inſpired, but could afford no reaſon to conclude that he was not the author of the writings which bear his name, ſince miſtakes may be committed by the moſt accurate hiſtorian. The chief difficulties of this nature are found in the goſpel according to St Luke, and do not apply to the writings of Matthew, John, Paul, and Peter. Laying aſide the idea of inſpiration altogether, let us inquire whether Luke or Joſephus be moſt intitled to credit in thoſe paſſages where they differ; which of them is moſt accurate, and which of them had the beſt opportunities of exploring the truth of the facts which they relate. Now Joſephus relates the ſame ſtory differently in different parts of his works, and is ſometimes equally miſtaken in them all. We do not recollect to have ſeen ſuch inconſiſtencies in the writings of St Luke. Luke knew the characters, and witneſſed many of the facts, of which he ſpeaks; and he could receive the beſt information reſpecting thoſe facts which were tranſacted in his abſence. Joſephus was born A. D. 37, ſome years after our Saviour's aſcenſion. Now it is a very important obſervation of Michaelis, that the period of hiſtory with which mankind are leaſt acquainted is that which includes the time of their childhood and youth, together with the twenty or thirty years immediately preceding their birth. Concerning the affairs tranſacted during that period, we are much more liable to fall into miſtakes than concerning thoſe

115 or to his want of authentic information concerning the events that happened near his birth.

Scripture. those of a remoter age. The reaſon is, that authentic hiſtory never comes down to the period of our birth; our knowledge of the period immediately preceding depends on hearſay; and the events, which paſs within the firſt eighteen or twenty years of our lives, we are too young and heedleſs to obſerve with attention. This muſt have been more remarkably the caſe in the time of Joſephus than at preſent, when there were neither daily papers nor periodical journals to ſupply the want of regular annals. There was no hiſtorian from whom Joſephus could derive any knowledge of the times that immediately preceded his birth. There is a period then of forty or fifty years, in which, even with the moſt diligent inquiry, he was expoſed to error.

When we find therefore the relations of Luke and Joſephus ſo different as not to be reconciled, it would be very unfair to determine without any further inquiry in favour of Joſephus. Let their character, and works, and ſituation, be ſtrictly examined; let their teſtimony be duly weighed and compared; and then let the preference be given to that author who, according to the ſtricteſt rules of equity and juſtice, ſeems intitled to the higheſt degree of credit. The deciſion of a jury, we ſhall venture to ſay, would in every inſtance turn out in favour of Luke.

116 Inſpiration of the New Teſtament, Having thus aſcertained the authenticity of the books of the New Teſtament, the next thing to be conſidered is their inſpiration. It is certainly of ſome importance to know how far the apoſtles and evangeliſts were guided in their writings by the immediate influence of the ſpirit of God; though this knowledge, if attainable, is not equally important with that of the authenticity of theſe writings. Michaelis indeed aſſerts, that the divinity of the New Teſtament may be proved whether we can evince it to be written by immediate inſpiration or not *. "The queſtion (ſays he), whether the books of the New Teſtament are inſpired? is not ſo important as the queſtion, whether they are genuine? The truth of our religion depends upon the latter, not abſolutely on the former. Had the Deity inſpired not a ſingle book of the New Teſtament, but left the apoſtles and evangeliſts without any other aid than that of natural abilities to commit what they knew to writing, admitting their works to be authentic, and poſſeſſed of a ſufficient degree of credibility, the Chriſtian religion would ſtill be well founded. The miracles by which it is confirmed would equally demonſtrate its truth, even if the perſons who atteſted them were not inſpired, but ſimply human witneſſes; and their divine authority is never preſuppoſed, when we diſcuſs the queſtion of miracles, but merely their credibility as human evidence. If the miracles are true which the evangeliſts relate, the doctrines of Chriſt recorded in the goſpels are proved to be the infallible oracles of God; and, even if we admit the apoſtles to be miſtaken in certain not eſſential circumſtances, yet as the main points of the religion which Chriſt commiſſioned them to preach are ſo frequently repeated, their epiſtles would inſtruct us as well in the tenets of the Chriſtian ſyſtem, as the works of Maclaurin in the philoſophy of Newton. It is poſſible therefore to doubt, and even deny, the inſpiration of the New Teſtament, and yet be fully perſuaded of the truth of the Chriſtian religion: and many really entertain theſe ſentiments either publicly or in private, to whom we ſhould render great injuſtice, if we ranked them in the claſs of unbelievers.

* Chap. iii. § 1.

117 not neceſſary to the truth of Chriſtianity according to the opinion of Michaelis.

Scripture.

"Yet the Chriſtian religion would be attended with difficulty, if our *principium cognoſcendi* reſted not on firmer ground; and it might be objected, that ſufficient care had not been taken for thoſe whoſe conſciences were tender, and who were anxiouſly fearful of miſtaking the ſmalleſt of the divine commands. The chief articles indeed of Chriſtianity are ſo frequently repeated, both by Chriſt and his apoſtles, that even were the New Teſtament not inſpired, we could entertain no doubt of the following doctrines: 'Jeſus was the Meſſias of the Jews, and an infallible meſſenger of God: he died for our iniquity; and by the ſatisfaction made by his death we obtain remiſſion of ſins, if on our part be faith and amendment of life: the Levitical law is aboliſhed, and moral precepts, with the ceremonies of Baptiſm and the Supper of the Lord, are appointed in its ſtead; after the preſent follows an everlaſting life, in which the virtuous ſhall be rewarded and the wicked puniſhed, and where Chriſt himſelf ſhall be the Judge.'

"To the epiſtles indeed (ſays Michaelis), inſpiration is of real conſequence; but with reſpect to the hiſtorical books, viz. the Goſpels and the Acts of the Apoſtles, we ſhould really be no loſers if we abandoned the ſyſtem of inſpiration, and in ſome reſpects have a real advantage. We ſhould be no loſers, if we conſidered the apoſtles in hiſtorical facts as merely human witneſſes, as Chriſt himſelf has done in ſaying, 'Ye alſo ſhall bear witneſs, becauſe ye have been with me from the beginning *.' And no one that attempts to convince an unbeliever of the truth of Chriſtianity, would begin his demonſtration by preſuppoſing a doctrine which his adverſary denies, but would ground his arguments on the credibility of the evangeliſts as human hiſtorians, for the truth of the miracles, the death, and the reſurrection of Chriſt. Even thoſe who examine the grounds of their faith for their own private conviction, muſt treat the evangeliſts as human evidence; ſince it would be arguing in a circle to conclude that the facts recorded in the goſpels are true, becauſe they are inſpired, when we conclude the Scriptures to be inſpired in conſequence of their contents. In theſe caſes, then, we are obliged to conſider the evangeliſts as human evidence; and it would be no detriment to the Chriſtian cauſe to conſider them at all times as ſuch in matters of hiſtorical fact. We find it nowhere expreſsly recorded that the public tranſactions which the apoſtles knew by their own experience, and of which St Luke informed himſelf by diligent inquiry, ſhould be particular objects of divine inſpiration. We ſhould even be conſiderable gainers, in adjuſting the harmony of the goſpels, if we were permitted to ſuppoſe that ſome one of the evangeliſts had committed an immaterial error, and that St John has rectified ſome trifling miſtakes in the preceding goſpels. The moſt dangerous objections which can be made to the truth of our religion, and ſuch as are moſt difficult to anſwer, are thoſe drawn from the different relations of the four evangeliſts."

* John xv. 27.

118 Different meanings of the word *inſpiration*.

Before any inquiry is made reſpecting the inſpiration of the books of the New Teſtament, it is neceſſary to determine the meaning of the term; for theologians have given to it a variety of ſignifications. Moſt of the German divines make it to conſiſt in an infuſion of

Scripture. words as well as ideas. Luther, Beza, and Salmaſius, reſtrict it to ideas alone. Doddridge underſtands by it an intervention of the Deity, by which the natural faculties of the mind were directed to the diſcovery of truth. Warburton and Law think it was a negative intervention to preſerve the ſacred writers from eſſential errors. Some believe every circumſtance was dictated by the Holy Ghoſt; others ſuppoſe that no ſupernatural aſſiſtance was granted except in the epiſtolary writings. See INSPIRATION.

As there is an evident diſtinction between inſpiration and revelation, and as the origin of the Chriſtian religion may be ſtill proved divine, even though it were denied that thoſe who record its facts and doctrines were inſpired in the act of writing, it will be moſt judicious and ſafe to employ the word *inſpiration* in that ſenſe which can be moſt eaſily defended and ſupported. By doing this, much may be gained and nothing loſt. It is difficult to prove to a deiſt that the words of Scripture are divine, becauſe he ſees that every writer has words and phraſes peculiar to himſelf. It is difficult alſo to prove that the ideas were infuſed into the mind of the authors while they were engaged in the act of writing; becauſe concerning facts they appeal not to divine inſpiration, but declare *what they have ſeen and heard*. In reaſoning they add their own ſentiments to what they had received from the Lord, and ſubjoin, eſpecially in their epiſtles, things not connected with religion. The definition which Doddridge gives, ſeems applicable to ordinary gifts or the uſual endowments of rational creatures, rather than to the extraordinary gifts of the Holy Spirit, which were beſtowed on the apoſtles. Thoſe who maintain that every fact or circumſtance was ſuggeſted by divine inſpiration, will find it no eaſy matter to prove their poſition. The opinion of Warburton and Law, with proper explanations, ſeems moſt probable. The opinion of Grotius, that only the epiſtles were inſpired, may be eaſily refuted.

The proof of the authenticity of the New Teſtament depends on human teſtimony: The proof of its inſpiration is derived from the declaration of inſpired perſons.

119 The proof of it depends on the declarations of Chriſt and his apoſtles.

In proving that the New Teſtament is inſpired, we preſuppoſe its authenticity, that the ſacred books were written by the apoſtles whoſe names they bear, and that they have been conveyed to us pure and uncorrupted. This we have already attempted to prove, and we hope with ſucceſs. The evidence of inſpiration is the teſtimony of Chriſt and his apoſtles, which we receive as credible, becauſe they confirmed their doctrines by miracles. From the important miſſion of Chriſt and his apoſtles, we infer that every power was beſtowed which divine wiſdom thought expedient; and from their conduct we conclude, that it is morally impoſſible that they could lay claim to any powers which they did not poſſeſs. It is proper therefore to inquire into the declarations of Chriſt and his apoſtles concerning the nature, degree, and extent, of the inſpiration beſtowed on the writers of the ſacred books.

120 The declarations of Chriſt.

If we conſider Chriſt's more immediate promiſes of inſpiration to the apoſtles, we ſhall find that he has given them, in the moſt proper ſenſe of the word, at three ſeveral periods, 1ſt, When he ſent the apoſtles to preach the goſpel *; 2dly, In holding a public diſcourſe relating to the goſpel, at which were preſent a conſiderable multitude; 3dly, In his prophecy of the deſtruction of Jeruſalem †. When he ſent the apoſtles to preach the goſpel, he thus addreſſed them: "When they deliver you up, take no thought how or what ye ſhall ſpeak, for it ſhall be given you in that ſame hour what ye ſhall ſpeak; for it is not you that ſpeak, but the ſpirit of your father that ſpeaketh in you." The ſame promiſe was made almoſt in the ſame words in the preſence of an immenſe multitude (Luke xii. 11, 12.). From theſe paſſages it has been urged, that if the apoſtles were to be inſpired in the preſence of magiſtrates in delivering ſpeeches, which were ſoon to be forgotten, it is ſurely reaſonable to conclude that they would be inſpired when they were to compoſe a ſtandard of faith for the uſe of all future generations of Chriſtians. If this concluſion be fairly deduced, it would follow that the writings of the New Teſtament are the dictates of inſpiration, not only in the doctrines and precepts, but in the very words. But it is a concluſion to which ſincere Chriſtians have made objections; for, ſay they, though Chriſt promiſes to aſſiſt his apoſtles in caſes of great emergency, where their own prudence and fortitude could not be ſufficient, it does not follow that he would dictate to them thoſe facts which they knew already, or thoſe reaſonings which their own calm reflection might ſupply. Beſides, ſay they, if the New Teſtament was dictated by the Holy Spirit, and only penned by the apoſtles, what reaſon can be given for the care with which Chriſt inſtructed them both during his miniſtry and after his crucifixion in thoſe things pertaining to the kingdom of God?

* Matt. x. 19, 20.

Scripture. † Mark xiii. 11.; Luke xxi. 14, 15.

121 Proper idea of inſpiration.

In anſwer to this, we may obſerve, that though it be difficult to prove that the identical words of the New Teſtament were dictated by the Holy Spirit, or the train of ideas infuſed into the minds of the ſacred writers, there is one ſpecies of inſpiration to which the New Teſtament has an undoubted claim. It is this, that the memories of the apoſtles were ſtrengthened and their underſtandings preſerved from falling into eſſential errors. This we prove from theſe words of our Saviour, "and I will pray the Father, and he will give you another comforter, that he may abide with you for ever. He ſhall teach you all things, and bring all things to your remembrance whatſoever I have ſaid unto you *." This promiſe was ſurely not reſtrained to the day of Pentecoſt: it muſt have been a permanent gift, enabling the apoſtles at all times to remember with accuracy the diſcourſes of our Saviour. When the apoſtles therefore (Matthew and John) relate thoſe precepts of Chriſt which they themſelves had heard, they write indeed from memory, but under the protection of the ſpirit who ſecures them from the danger of miſtake: and we muſt of courſe conclude that their goſpels are inſpired.

* John xiv. 16, 26.

Were we called upon more particularly to declare what parts of the New Teſtament we believe to be inſpired, we would anſwer, The doctrines, the precepts, and the prophecies, every thing eſſential to the Chriſtian religion. From theſe the idea of inſpiration is inſeparable. As to the events, the memory of the apoſtles was ſufficient to retain them. If this opinion be juſt, it would enable us to account for the diſcrepancies between the ſacred writers, which are chiefly confined to the relation of facts and events.

All the books of the New Teſtament were originally written in Greek, except the Goſpel according to Matthew

Scripture.

122 Language in which the New Teſtament was compoſed.

123 Why the greateſt part of it is written in Greek.

thew and the epiſtle to the Hebrews, which there is reaſon to believe were compoſed in the Syro-Chaldaic language, which in the New Teſtament is called Hebrew.

Various reaſons have been aſſigned why the greateſt part of the New Teſtament was written in Greek; but the true reaſon is this, It was the language beſt underſtood both by writers and readers. Had St Paul written to a community in the Roman province of Africa, he might have written perhaps in Latin; but epiſtles to the inhabitants of Corinth, Galatia, Epheſus, Philippi, and Theſſalonica, to Timothy, Titus, and Philemon, from a native of Tarſus, could hardly be expected in any other language than Greek. The ſame may be ſaid of the epiſtles of St Peter, which are addreſſed to the Chriſtians of different countries, who had no other language in common than the Greek; and likewiſe of the epiſtles of St James, who wrote to Jews, that lived at a diſtance from Paleſtine, and were ignorant of Hebrew. The native language of St Luke, as well as of Theophilus, to whom he addreſſed his goſpel, and Acts of the apoſtles, appears to have been Greek; and that St John wrote his goſpel in that language, and not in Hebrew, is by no means a matter of ſurpriſe, ſince he wrote at Epheſus.

Michaelis, vol. i. chap. iv. ſect. 1. p. 101.

With reſpect to the epiſtle to the Romans, it may be aſked indeed why St Paul did not write in Latin? Now, whoever propoſes this queſtion, muſt preſuppoſe that St Paul was maſter of the Latin language in ſuch a degree as to find no difficulty in writing it; a matter which remains to be proved. It is very probable that St Paul was acquainted with the Latin; but between underſtanding a language, and being able to write it, there is a very material difference. As St Paul was a native of Tarſus, his native language was Greek; he had travelled during ſeveral years through countries in which no other language was ſpoken, and when he addreſſed the Roman centurion at Jeruſalem, he ſpoke not Latin, but Greek. Is it extraordinary, then, that in writing to the inhabitants of Rome he ſhould have uſed a language which was there ſo generally underſtood? It has been long remarked, that Greek was at that time as well known in Rome as French in any court of modern Europe; that according to Juvenal even the female ſex made uſe of Greek as the language of familiarity and paſſion; and that in letters of friendſhip Greek words and phraſes were introduced with greater freedom than French expreſſions in German letters, as appears from Cicero's epiſtles to Atticus, and from thoſe of Auguſtus preſerved in the works of Suetonius. To this muſt be added a material circumſtance, that a great part of the Roman Chriſtians conſiſted of native Jews, who were better acquainted with Greek than with Latin, as either they themſelves or their anceſtors had come from Greece, Aſia Minor, or Egypt, in which Greek was the language of the country. At leaſt they read the Bible in that language, as no Latin tranſlation of the Old Teſtament at that time exiſted; and the Chriſtian church at that period conſiſting chiefly of Jews, the heathen converts in Rome were of courſe under the neceſſity of accuſtoming themſelves to the Greek language. In ſhort, St Paul in his epiſtle to the Romans made uſe of a language in which alone thoſe who were ignorant of Hebrew could read the Bible. What has been here advanced reſpecting the epiſtle to the Romans is equally applicable to the Greek of St Mark, on the ſuppoſition that it was written at Rome. Scripture.

To the above arguments may be added the example of Joſephus, who, as well as the apoſtles, was by birth a Jew. He even lived in Rome, which is more than can be ſaid of St Paul and St Mark, who reſided there only a certain time: he was likewiſe younger than either; he came to Italy at an age which is highly ſuitable to the learning of a language, and previous to that period had ſpent ſeveral years in the Roman camp. The Jewiſh antiquities, the hiſtory of the Jewiſh war, and the account of his own life, he wrote undoubtedly with a view of their being read by the Romans; and yet he compoſed all theſe writings in Greek. He expreſſes his motive for writing his Greek account of the Jewiſh war in the following terms: "That having written in his native language (i. e. the Hebrew dialect at that time ſpoken) a hiſtory of the war, in order that Parthians, Babylonians, Arabians, Adiabenes, and the Jews beyond the Euphrates, might be informed of thoſe events, he was now reſolved to write for the Greeks and Romans, who had not been engaged in the campaigns, a more certain account than had hitherto been given." The motives which induced Joſephus to write in Greek are fully as applicable to St Paul and St Mark.

Michaelis, vol. i. chap. iv. ſect. 3. p. 111.

Michaelis has thus characterized the ſtyle of the New Teſtament. "The New Teſtament (ſays he) was written in a language at that time common among the Jews, which may be named Hebraic Greek; the firſt traces of which we find in the tranſlation of the LXX.

124 Is full of Hebraiſms.

"Every man acquainted with the Greek language, who had never heard of the New Teſtament, muſt immediately perceive, on reading only a few lines, that the ſtyle is widely different from that of the claſſic authors. We find this character in all the books of the New Teſtament in a greater or leſs degree, but we muſt not therefore conclude that they poſſeſs an uniformity of ſtyle. The harſheſt Hebraiſms, which extended even to grammatical errors in the government of caſes, are the diſtinguiſhing marks of the book of Revelation; but they are accompanied with tokens of genius and poetical enthuſiaſm of which every reader muſt be ſenſible who has taſte and feeling. There is no tranſlation of it which is not read with pleaſure even in the days of childhood; and the very faults of grammar are ſo happily placed as to produce an agreeable effect. The goſpels of St Matthew and St Mark have ſtrong marks of this Hebraic ſtyle; the former has harſher Hebraiſms than the latter, the fault of which may be aſcribed to the Greek tranſlator, who has made too literal a verſion, and yet the goſpel of St Mark is written in worſe language, and in a manner that is leſs agreeable. The epiſtles of St James and St Jude are ſomewhat better; but even theſe are full of Hebraiſms, and betray in other reſpects a certain Hebrew tone. St Luke has in ſeveral paſſages written pure and claſſic Greek, of which the firſt four verſes of his goſpel may be given as an inſtance: in the ſequel, where he deſcribes the actions of Chriſt, he has very harſh Hebraiſms, yet the ſtyle is more agreeable than that of St Matthew or St Mark. In the Acts of the apoſtles he is not free from Hebraiſms, which he ſeems to have never ſtudiouſly avoided; but his periods are more claſſically turned, and ſometimes poſſeſs beauty

Scripture.

beauty devoid of art. St John has numerous, though not uncouth, Hebraiſms both in his goſpel and epiſtles; but he has written in a ſmooth and flowing language, and ſurpaſſes all the Jewiſh writers in the excellence of narrative. St Paul again is entirely different from them all; his ſtyle is indeed neglected and full of Hebraiſms, but he has avoided the conciſe and verſe-like conſtruction of the Hebrew language, and has upon the whole a conſiderable ſhare of the roundneſs of Grecian compoſition. It is evident that he was as perfectly acquainted with the Greek manner of expreſſion as with the Hebrew, and he has introduced them alternately, as either the one or the other ſuggeſted itſelf the firſt, or was the beſt approved."

125 and foreign idioms.

Michaelis has ſhown that the New Teſtament not only contains Hebraiſms but Rabbiniſms, Syriaſms, Chaldaiſms, Arabiſms, Latiniſms, and Perſian words, of which he has exhibited many ſpecimens. To theologians, whoſe duty it certainly is to ſtudy the language of the New Teſtament with attention, we would ſtrenuouſly recommend the peruſal of this work, which in the Engliſh tranſlation is one of the moſt valuable acceſſions to ſcriptural criticiſm that has yet appeared. We ſpeak of the Engliſh tranſlation, which the large and judicious notes of Mr Marſh has rendered infinitely ſuperior to the original.

126 Peculiarities in the compoſition. *Dr Campbell's Preliminary Diſſertations to his Tranſlations of the Goſpels.*

To the obſervations which have been made reſpecting the language of the New Teſtament, a few remarks may be added concerning the peculiarities of the ſtyle and manner of the ſacred writers, particularly the hiſtorians. Theſe remarks extend to the Old Teſtament as well as to the New.—The *firſt* quality for which the ſacred hiſtory is remarkable is ſimplicity in the ſtructure of the ſentences. The firſt five verſes of Geneſis furniſh an example, which conſiſt of eleven ſentences. The ſubſtantives are not attended by adjectives, nor the verbs by adverbs, no ſynonymas, no ſuperlatives, no effort at expreſſing things in a bold, emphatical, or uncommon manner.

2. The ſecond quality is ſimplicity of ſentiment, particularly in the Pentateuch, ariſing from the very nature of the early and uncultivated ſtate of ſociety about which that book is converſant.

3. Simplicity of deſign. The ſubject of the narrative ſo engroſſes the attention of the writer, that he himſelf is as nobody. He introduces nothing as from himſelf, no remarks, doubts, conjectures, or reaſonings. Our Lord's biographers particularly excel in this quality. This quality of ſtyle we meet with in Xenophon and Cæſar.

The Evangeliſts may be ranked next to Geneſis for ſimplicity of compoſition in the ſentences. John and Matthew are diſtinguiſhed for it more than Mark and Luke. But the ſentiment is not ſo remarkable for ſimplicity in the Evangeliſt as the Pentateuch. The reaſons of this difference are, the ſtate of the Jews was totally changed; their manners, cuſtoms, &c. ſplit into factions both in religion and politics. 2. The object of our Lord's miniſtry, which is the great ſubject of the goſpels, was *to inculcate a doctrine and morality* with which none of their ſyſtems perfectly coincided: beſides, being conſtantly oppoſed by all the great men, the greater part of his hiſtory conſiſts of inſtructions and diſputes. 3. As it is occupied with what our Saviour ſaid and what he did, this makes two diſtinctions of ſtyle and manner; that of our Saviour, and the ſacred penman's. In their own character, they neither explain nor command, promiſe nor threaten, praiſe nor blame. They generally omit the names of our Lord's enemies; thus directing our hatred at the vices they committed, not at the perſons. They never mention ſuch perſons without neceſſity; which is the caſe with the high-prieſt, Pilate, Herod, and Judas: the three firſt for the chronology, the fourth to do juſtice to the eleven.

Scripture.

Herodias is indeed mentioned with diſhonour; but her crime was a public one. On the other hand, all perſons diſtinguiſhed for any thing virtuous are carefully mentioned, Joſeph of Arimathea, Nicodemus, Zaccheus, Bartimeus, Jairus, Lazarus, Mary, and Martha. They record their own faults (Peter's, Thomas's), nor do they make any merit of their confeſſion. In one uniform ſtrain they relate the moſt ſignal miracles and moſt ordinary facts.

From the narrative is excluded that quality of ſtyle which is called *animation*. Nothing that diſcovers paſſion in the writer or is calculated to excite the paſſions of the reader. Every thing is directed to mend the heart.

But in the diſcourſes and dialogues of our Saviour the expreſſion, without loſing any thing of its ſimplicity, is often remarkable for ſpirit and energy. Reſpecting harmony and ſmoothneſs, qualities which only add an external poliſh to language, they had not the leaſt ſolicitude.

As to elegance, there is an elegance which reſults from the uſe of ſuch words as are moſt in uſe with thoſe who are accounted fine writers, and from ſuch arrangements in the words and clauſes as have generally obtained their approbation. This is diſclaimed by the ſacred authors.

But there is an elegance of a ſuperior order more nearly connected with the ſentiment; and in this ſort of elegance they are not deficient. In all the oriental languages great uſe is made of tropes, eſpecially metaphors. When the metaphors employed bear a ſtrong reſemblance, they confer vivacity: if they be borrowed from objects which are naturally agreeable, beautiful, or attractive, they add alſo elegance. The Evangeliſts furniſh us with many examples of this kind of vivacity and elegance. Our Lord borrows tropes from cornfields, vineyards, gardens, &c.

127 Proper method of ſtudying the New Teſtament by analyſis and induction.

As a valuable appendage to this part of our ſubject, we ſhall ſubjoin Dr Campbell's method of ſtudying the books of the New Teſtament. This we offer to our readers as a beautiful inſtance of the judicious application of philoſophy to ſacred ſtudies. It is the ſame method of diſcovering truth by analyſis and induction, which was purſued by Sir Iſaac Newton with ſuch aſtoniſhing ſucceſs, which ſince his time has been uniformly practiſed in natural philoſophy, and has been alſo applied to chemiſtry, to medicine, to natural hiſtory, and to the philoſophy of mind, by the ingenious Dr Reid. This is the path of ſound philoſophy, which can alone lead to the diſcovery of truth. In following it, our progreſs may be ſlow, but it will be ſure. If all theologians would ſteadily adhere to it, we might then entertain the pleaſing hope of diſcarding for ever thoſe abſurd ſyſtems of religion which are founded on ſingle paſſages and detached fragments of ſcripture, and of eſtabliſhing opinions and doctrines on a ſolid foundation.

"1. To

Scripture.

128 Dr Campbell's method. *Prel. Dif. to the Goſpels.*

" 1. To get acquainted with each writer's ſtyle; to obſerve his manner of compoſition, both in ſentences and paragraphs; to remark the words and phraſes peculiar to him, and the peculiar application that he may ſometimes make of ordinary words; for there are few of thoſe writers who have not their peculiarities in all the reſpects now mentioned. This acquaintance with each can be attained only by the frequent and attentive reading of his works in his own language.

" 2. To inquire into the character, the ſituation, and the office of the writer, the time, the place, and the occaſion of his writing, and the people for whoſe immediate uſe he originally intended his work. Every one of theſe particulars will ſometimes ſerve to elucidate expreſſions otherwiſe obſcure or doubtful. This knowledge may in part be learned from a diligent and reiterated peruſal of the book itſelf, and in part be gathered from what authentic, or at leaſt probable, accounts have been tranſmitted to us concerning the compilement of the canon.

" 3. The laſt general direction is, to conſider the principal ſcope of the book, and the particulars chiefly obſervable in the method by which the writer has purpoſed to execute his deſign. This direction is particularly applicable to the epiſtolary writings, eſpecially thoſe of Paul.

" 4. If a particular word or phraſe occur, which appears obſcure, perhaps unintelligible, the firſt thing we ought to do, if ſatisfied that the reading is genuine, is to conſult the context, to attend to the manner wherein the term is introduced, whether in a chain of reaſoning or in a hiſtorical narration, in a deſcription, or included in an exhortation or command. As the concluſion is inferred from the premiſſes, or as from two or more known truths a third unknown or unobſerved before may fairly be deduced; ſo from ſuch attention to the ſentence in connection, the import of an expreſſion, in itſelf obſcure or ambiguous, will ſometimes with moral certainty be diſcovered. This, however, will not always anſwer.

" 5. If it do not, let the ſecond conſideration be, whether the term or phraſe be one of the writer's peculiarities. If ſo, it comes naturally to be inquired, what is the acceptation in which he employs it in other places? If the ſenſe cannot be preciſely the ſame in the paſſage under review, perhaps, by an eaſy and natural metaphor or other trope, the common acceptation may give riſe to one which perfectly ſuits the paſſage in queſtion.—Recourſe to the other places wherein the word or phraſe occurs in the ſame author is of conſiderable uſe, though the term ſhould not be peculiar to him.

" 6. But thirdly, if there ſhould be nothing in the ſame writer that can enlighten the place, let recourſe be had to the parallel paſſages, if there be any ſuch, in the other ſacred writers. By parallel paſſages, I mean thoſe places, if the difficulty occur in hiſtory, wherein the ſame or a ſimilar ſtory, miracle, or event, is related; if in teaching or reaſoning, thoſe parts wherein the ſame argument or doctrine is treated, or the ſame parable propounded; and in moral leſſons, thoſe wherein the ſame claſs of duties is recommended; or, if the difficulty be found in a quotation from the Old Teſtament, let the parallel paſſage in the book referred to, both in the original Hebrew, and in the Greek verſion, be conſulted.

Scripture.

" 7. But if in theſe there be found nothing that can throw light on the expreſſion of which we are in doubt, the fourth recourſe is to all the places wherein the word or phraſe occurs in the New Teſtament, and in the Septuagint verſion of the Old, adding to theſe the conſideration of the import of the Hebrew or Chaldaic word, whoſe place it occupies, and the extent of ſignification, of which in different occurrences ſuch Hebrew or Chaldaic term is ſuſceptible.

" 8. Perhaps the term in queſtion is one of thoſe which very rarely occur in the New Teſtament, or thoſe called ἅπαξ λεγομενα, only once read in Scripture, and not found at all in the tranſlation of the Seventy. Several ſuch words there are. There is then a neceſſity, in the fifth place, for recurring to the ordinary acceptation of the term in claſſical authors. This is one of thoſe caſes wherein the interpretation given by the earlieſt Greek fathers deſerves particular notice. In this, however, I limit myſelf to thoſe comments wherein they give a literal expoſition of the ſacred text, and do not run into viſion and allegory.

129 Manuſcripts of the New Teſtament.

The manuſcripts of the New Teſtament are the natural ſource from which the genuine readings of the Greek Teſtament are to be drawn. The printed editions are either copies of more ancient editions, or of manuſcripts; and they have no further authority than as they correſpond to the manuſcripts from which they were originally taken. By manuſcripts of the New Teſtament, we mean thoſe only which were written before the invention of printing. The moſt ancient of theſe are loſt, and there is no manuſcript now extant older than the ſixth century. Few contain the whole New Teſtament; ſome contain the four goſpels; ſome the Acts of the Apoſtles and Epiſtles; and others the book of Revelation. The greateſt number are thoſe which contain the firſt part; thoſe which have the ſecond, or the firſt and ſecond together, are likewiſe numerous; but thoſe of the third are extremely few. It muſt be added alſo, that in many manuſcripts thoſe epiſtles are omitted whoſe divine authority was formerly doubted.

There are many manuſcripts which have been examined only for a ſingle text, ſuch as 1 John v. 7. or at leaſt for a very ſmall number. Others have been examined from the beginning to the end, but not completely and in reſpect of all the readings. A third claſs conſiſts of ſuch as either have been, or are ſaid to have been, completely and accurately collated. But this requires ſuch phlegmatic patience, that we can hardly expect to find in critical catalogues all the various readings which have been only once collated. Wetſtein, in collating many manuſcripts anew, made diſcoveries which had entirely eſcaped the notice of his predeceſſors. The fourth claſs conſiſts of ſuch as have been completely and accurately collated more than once; but here alſo we are in danger of being led into error.—When various readings are transferred from one critical edition to another, as from that of Gregory to Mill's edition, and from the latter to thoſe of Bengel and Wetſtein, the manuſcripts muſt ſometimes be falſely named, and various readings muſt frequently be omitted. And as Wetſtein has marked by ciphers manuſcripts that in former editions had been denoted by their initial letters, he could ſcarcely avoid ſubſtituting, in ſome caſes, one figure inſtead of another. The fifth claſs, which is by far the moſt valuable, conſiſts of ſuch as have

Scripture. have been printed word for word, and therefore form an original edition of the Greek Teſtament. We can boaſt but of a very few manuſcripts of this kind. Hearne printed at Oxford, in 1715, the acts of the Apoſtles in Greek and Latin from the Codex Laudianus 3.; Knittel has annexed to his edition of Ulphilas, p. 53—118, a copy of two very ancient fragments preſerved in the library of Wolfenbuttle; the one of the four Goſpels in general, the other of St Luke and St John. Woide printed in 1786 the Codex Alexandrinus, a manuſcript of great antiquity, which ſhall afterwards be more fully deſcribed; and the Univerſity of Cambridge has reſolved to publiſh, in a ſimilar manner, the Cod. Cant. I. or, as it is ſometimes called, the Codex Bezæ, the care of which is intruſted to Dr Kipling, a publication which will be thankfully received by every friend to ſacred criticiſm. It was the intention of the Abbé Spoletti, a few years ago, to publiſh the whole of the celebrated Codex Vaticanus; which would likewiſe have been a moſt valuable acceſſion, ſince a more important manuſcript is hardly to be found in all Europe. He delivered for this purpoſe a memorial to the pope; but the deſign was not put into execution, either becauſe the pope refuſed his aſſent or the abbé abandoned it himſelf. See the Oriental Bible, vol. xxii. n° 333. and vol. xxiii. n° 348.

130 Michaelis's propoſal of taking an impreſſion of ancient manuſcripts, vol. ii. p. 182.

"A very valuable library," ſays Michaelis, "might be compoſed of the impreſſions of ancient manuſcripts, which, though too expenſive for a private perſon, ſhould be admitted into every univerſity collection, eſpecially the Alexandrian and Cambridge manuſcripts, to which I would add, if it were now poſſible to procure it, Hearne's edition of the Codex Laudianus 3. A plan of this ſort could be executed only in England, by a private ſubſcription, where a zeal is frequently diſplayed in literary undertakings that is unknown in other countries; and it were to be wiſhed that the project were begun before length of time has rendered the manuſcripts illegible, and the attempt therefore fruitleſs. Ten thouſand pounds would go a great way towards the fulfilling of this requeſt, if the learned themſelves did not augment the difficulty of the undertaking, by adding their own critical remarks, and endeavouring thereby to recommend their publications, rather than by preſenting to the public a faithful copy of the original. Should poſterity be put in poſſeſſion of faithful impreſſions of important manuſcripts, an acquiſition which would render the higheſt ſervice to ſacred criticiſm, all theſe editions of the New Teſtament ſhould be regulated on the ſame plan as Hearne's edition of the Acts of the Apoſtles." It muſt be highly flattering to the patriotic ſpirit of an Engliſhman to hear the encomiums which learned foreigners have ſo profuſely beſtowed on our liberality in ſupporting works of genius and learning and public utility. The plan which Michaelis propoſes to us, in preference to all the other nations in Europe, is noble and magnificent, and would certainly confer immortality on thoſe men who would give it their patronage and aſſiſtance. Scripture.

There are many ancient manuſcripts, eſpecially in Italy, which have never been collated, but lie ſtill unexplored. Here is a field where much remains to be done. See Marſh's Notes to Michaelis, vol. ii. p. 643.

Michaelis has given a catalogue of ancient manuſcripts, amounting in number to 292, to which he has added a ſhort account of each. In this place we ſhall confine our obſervations to the moſt celebrated, the Alexandrian and Vatican manuſcripts, which we have chiefly extracted from Michaelis.

131 Account of the Alexandrian manuſcript.

The *Alexandrian manuſcript* conſiſts of four volumes; the firſt three of which contain the Old Teſtament, the fourth the New Teſtament, together with the firſt Epiſtle of Clement to the Corinthians, and a fragment of the ſecond. In the New Teſtament, which alone is the object of our preſent inquiry, is wanting the beginning as far as Matthew xxv. 6. ὁ νυμφιος ερχεται; likewiſe from John vi. 50. to viii. 52. and from 2 Cor. iv. 13. to xii. 7. It muſt likewiſe be obſerved, that the Pſalms are preceded by the epiſtle of Athanaſius to Marcellinus, and followed by a catalogue, containing thoſe which are to be uſed in prayer for each hour, both of the day and of the night; alſo by 14 hymns, partly apocryphal, partly biblical, the 11th of which is an hymn in praiſe of the Virgin Mary, entitled προσευχη μαριας της θεοτοκυ: further, the *Hypotheſes Euſebii* are annexed to the Pſalms, and his *Canones* to the Goſpels. It is true, that this has no immediate reference to the New Teſtament, but may have influence in determining the antiquity of the manuſcript itſelf.

It has neither accents nor marks of aſpiration; it is written with capital, or, as they are called, *uncial letters*, and has very few abbreviations. There are no intervals between the words; but the ſenſe of a paſſage is ſometimes terminated by a point, and ſometimes by a vacant ſpace. Here ariſes a ſuſpicion that the copyiſt did not underſtand Greek, becauſe theſe marks are ſometimes found even in the middle of a word, for inſtance Levit. v. 4. ανομος η for αν ομοση, and Numb. xiii. 29. μω Υσης.

This manuſcript was preſented to Charles I. in 1628, by Cyrillus Lucaris patriarch of Conſtantinople. Cyrillus himſelf has given the following account; "We know ſo much of this manuſcript of the holy writings of the Old and New Teſtament, that Thecla an Egyptian lady of diſtinction (*nobilis fœmina Ægyptia*) wrote it with her own hand 1300 years ago (A). She lived ſoon after the council of Nice. Her name was formerly at the end of the book; but when Chriſtianity was ſubverted in Egypt by the errors of Mahomet, the books of the Chriſtians ſuffered the ſame fate, and the name of Thecla

(A) He wrote this in the year 1628. According to this account, then, the manuſcript muſt have been written in 328; a date to which ſo many weighty objections may be made, that its moſt ſtrenuous advocates will hardly undertake to defend it. But this error has furniſhed Oudin with an opportunity of producing many arguments againſt the antiquity of the *Codex Alexandrinus*, which ſeem to imply, that Grabe and others, who have referred it to the fourth century, ſuppoſe it to have been written in the above-mentioned year. Now it is probable, that the inference which has been deduced from the account of Cyrillus is more than he himſelf intended to expreſs, as he relates that Thecla lived after the council of Nice.

Scripture. Thecla was expunged. But oral tradition of no very ancient date (*memoria et traditio recens*) has preſerved the remembrance of it.

But the reader will ſee that this account is merely traditional. Dr Semler very properly obſerves, that there is no more reaſon to rely on a tradition reſpecting the tranſcriber of an ancient manuſcript, than on a tradition which relates to an ancient relic. The arguments which have been urged by Wetſtein, Semler, Oudin, and Woide, to fix the date of this manuſcript, are ſo many, that it would be tedious to repeat them. But, after all, its antiquity cannot be determined with certainty, though it appears from the formation of the letters, which reſemble thoſe of the fourth and fifth centuries, and the want of accents, that it was not written ſo late as the tenth century. In this century it was placed by Oudin, while Grabe and Schulze have referred it to the fourth, which is the very utmoſt period that can be allowed, becauſe it contains the epiſtles of Athanaſius. Wetſtein, with more probability, has choſen a mean between theſe two extremes, and referred it to the fifth century: but we are not juſtified in drawing this inference from the formation of the letters alone, for it is well known that the ſame mode of forming the letters was retained longer in ſome countries and in ſome monaſteries than in others.

We are now in poſſeſſion of a perfect impreſſion of this manuſcript, which is accompanied with ſo complete and ſo critical a collection of various readings, as is hardly to be expected from the edition of any other manuſcript. Dr Woide publiſhed it in 1786, with types caſt for that purpoſe, line for line, without intervals between the words, as in the manuſcript itſelf: the copy is ſo perfect a reſemblance of the original, that it may ſupply its place. Its title is *Novum Teſtamentum Græcum è codice MS. Alexandrino qui Londini in Bibliotheca Muſei Britannici aſſervatur deſcriptum.* It is a very ſplendid folio; and the preface of the learned editor contains an accurate deſcription of the manuſcript, with an exact liſt of all its various readings, that takes up no leſs than 89 pages; and each reading is accompanied with a remark, in which is given an account of what his predeceſſors Juninus, Walton, Fell, Mill, Grabe, and Wetſtein, had performed or neglected.

132 Account of the Vatican manuſcript.

The *Vatican manuſcript* contained originally the whole Greek Bible, including both the Old and New Teſtament; and in this reſpect, as well as in regard to its antiquity, it reſembles none ſo much as the *Codex Alexandrinus*, but no two manuſcripts are more diſſimilar in their readings, in the New Teſtament as well as in the Old. After the Goſpels, which are placed in the uſual order, come the Acts of the Apoſtles, which are immediately followed by the ſeven catholic epiſtles. This muſt be particularly noted, becauſe ſome have contended that the ſecond Epiſtle of St Peter, with the ſecond and third of St John, were wanting. Profeſſor Hwiid, in a letter dated Rome, April 12. 1781, aſſured Michaelis that he had ſeen them with his own eyes, that the ſecond Epiſtle of St Peter is placed folio 1434, the ſecond of St John fol. 1442, the third fol. 1443: then follow the Epiſtles of St Paul, but not in the uſual order; for the Epiſtle to the Hebrews is placed immediately after thoſe to the Theſſalonians: and it is not improbable, that in the more ancient manuſcript, from which the *Codex Vaticanus* was copied, this Epiſtle was even placed before that to the Epheſians, and immediately after the Epiſtle to the Galatians (B); for the Epiſtles of St Paul are divided into 93 ſections by figures written in the margin with red ink; but the Epiſtle to the Galatians ends with 59, and that to the Epheſians begins with 70; the Epiſtle to the Hebrews, on the contrary, begins with 60, and ends with 69. With the words ἄμωμον τῷ Θεῷ, Heb. ix. 14. the manuſcript ceaſes, the remaining leaves being loſt. There is wanting, therefore, not only the latter part of this Epiſtle, but the Epiſtles to Timothy, Titus, and Philemon, with the Revelation of St John: but this laſt book, as well as the latter part of the Epiſtle to the Hebrews, has been ſupplied by a modern hand in the 15th century. In many places the faded letters have been alſo retouched by a modern, but careful hand; and when the perſon who made theſe amendments, who appears to have been a man of learning, found a reading in his own manuſcript which differed from that of the *Codex Vaticanus*, he has noted it in the margin, and has generally left the text itſelf untouched, though in ſome few examples he has ventured to eraſe it.

Scripture.

It is certain, that this manuſcript is of very high antiquity, though it has been diſputed which of the two in this reſpect is entitled to the preference, the *Vaticanus* or *Alexandrinus*. The editors of the Roman edition of the Septuagint, in 1587, referred the date of the Vatican manuſcript to the fourth century, the period to which the advocates for its great rival refer the *Codex Alexandrinus*. More moderate, and perhaps more accurate, are the ſentiments of that great judge of antiquity Montfaucon, who, in his *Bibliotheca Bibliothecarum*, p. 3. refers it to the fifth or ſixth century; and adds, that though he had ſeen other manuſcripts of equal antiquity, he had found none at the ſame time ſo complete.

The *Codex Vaticanus* has a great reſemblance to the manuſcripts noted by Wetſtein, C. D. L. 1. 13. 33. 69. 102. and to the Latin, Coptic, and Ethiopic verſions; but it is preferable to moſt of them, in being almoſt entirely free from thoſe undeniable interpolations and arbitrary corrections which are very frequently found in the above-mentioned manuſcripts, eſpecially in D. 1. and 69. It may be applied, therefore, as a mean not only of confirming their genuine readings, but of detecting and correcting thoſe that are ſpurious. It is written with great accuracy, and is evidently a faithful copy of the more ancient manuſcript from which it was tranſcribed. Peculiar readings, or ſuch as are found neither in other manuſcripts nor ancient verſions, are ſeldom diſcovered in the *Codex Vaticanus*; and of the few which have been actually found, the greateſt part are of little importance. But in proportion as the number of ſuch readings is ſmall, the number of thoſe s great; in ſupport of which few only, though ancient

(B) Probably becauſe the Epiſtle to the Hebrews, as well as the Epiſtle to the Galatians, relates to the abolition of the Moſaic law.

Scripture. authorities, have been hitherto produced: But this manuſcript has not throughout the whole New Teſtament the ſame uniform text.

As we have now a beautiful printed edition of the Alexandrian manuſcript by Dr Woide, it is much to be wiſhed that we had alſo an exact impreſſion of the Vatican manuſcript. From the ſuperſtitious fears and intolerant ſpirit of the inquiſition at Rome, all acceſs to this manuſcript was refuſed to the Abbé Spoletti, who preſented a memorial for that purpoſe. Unleſs the pope interpoſe his authority, we muſt therefore deſpair of having our wiſhes gratified; but from the liberality of ſentiment which the head of the Catholic church has ſhown on ſeveral occaſions, we hope that the period is not far diſtant when the Vatican library will be open to the learned, and when the pope will think it his greateſt honour to encourage their reſearches.

133 The beſt editions of the Greek New Teſtament are thoſe of Mill.

The moſt valuable editions of the Greek New Teſtament are thoſe of Mill, Bengel, and Wetſtein.

The edition of Mill, which was only finiſhed 14 days before his death, occupied the attention of the author for 30 years.

The collections of various readings which had been made before the time of Mill, the Veleſian, the Barberini, thoſe of Stephens, the London Polyglot, and Fell's edition, with thoſe which the Biſhop had left in manuſcript, and whatever he was able to procure elſewhere, he brought together into one large collection. He made likewiſe very conſiderable additions to it. He collated ſeveral original editions more accurately than had been done before: he procured extracts from Greek manuſcripts which had never been collated; and of ſuch as had been before collated, but not with ſufficient attention, he obtained more complete extracts. It is ſaid that he has collected from manuſcripts, fathers, and verſions, not fewer than 30,000 various readings. This collection, notwithſtanding its many imperfections, and the ſuperiority of that of Wetſtein, is ſtill abſolutely neceſſary to every critic: for Wetſtein has omitted a great number of readings which are to be found in Mill, eſpecially thoſe which are either taken from the Vulgate, or confirm its readings. Mill was indeed too much attached to this verſion; yet he cannot be accuſed of partiality in producing its evidence, becauſe it is the duty of a critic to examine the witneſſes on both ſides of the queſtion: and Wetſtein, by too frequently neglecting the evidence in favour of the Vulgate, has rendered his collection leſs perfect than it would otherwiſe have been. He likewiſe added, as far as he was able, readings from the ancient verſions; and is much to be commended for the great attention which he paid to the quotations of the fathers; the importance of which he had ſagacity enough to diſcern.

It cannot, however, be denied, that Mill's Greek Teſtament has many imperfections, and ſome of real importance. His extracts from manuſcripts often are not only incomplete, but erroneous; and it is frequently neceſſary to correct his miſtakes from the edition of Wetſtein. His extracts from the oriental verſions are alſo imperfect, becauſe he was unacquainted with theſe languages; and in ſelecting readings from the Syriac, the Arabic, and Ethiopic, he was obliged to have recourſe to the Latin tranſlations, which are annexed to thoſe verſions in the London Polyglot.

The great diligence which Mill had ſhown in collecting ſo many various readings, alarmed the clergy as if the Chriſtian religion had been in danger of ſubverſion. It gave occaſion for a time to the triumphs of the deiſt, and expoſed the author to many attacks. But it is now univerſally known, that not a ſingle article of the Chriſtian religion would be altered though a deiſt were allowed to ſelect out of Mill's 30,000 readings whatever he ſhould think moſt inimical to the Chriſtian cauſe. Scripture.

134 Bengel,

In 1734, Bengel abbot of Alpirſpach, in the duchy of Wurtemburg, publiſhed a new edition of the Greek Teſtament. The fears which Mill had excited began to ſubſide on this new publication; for Bengel was univerſally eſteemed a man of piety. Bengel was not only diligent in the examination of various readings, but in the ſtricteſt ſenſe of the word conſcientious; for he conſidered it as an offence againſt the Deity, if, through his own fault, that is, through levity or careleſſneſs, he introduced a falſe reading into the ſacred text. His object was not merely to make a collection of readings, and leave the choice of them to the judgement of the reader, but to examine the evidence on both ſides, and draw the inference; yet he has not given his own opinion ſo frequently as Mill, whom he reſembled in his reverence for the Latin verſion, and in the preference which he gave to harſh and difficult readings, before thoſe which were ſmooth and flowing. It may be obſerved in general, that he was a man of profound learning, and had a cool and ſound judgement, though it did not prevent him from thinking too highly of the Latin readings, and of the *Codex Alexandrinus*, with other Latinizing manuſcripts.

The imperfections of Bengel's edition ariſe chiefly from his diffidence and caution. He did not venture to inſert into the text any reading which had not already appeared in ſome printed edition, even though he believed it to be the genuine reading. In the book of Revelation indeed he took the liberty to inſert readings which had never been printed; becauſe few manuſcripts had been uſed in the printing of that book.

135 and of Wetſtein.

The celebrated edition of John James Wetſtein, which is the moſt important of all, and the moſt neceſſary to thoſe engaged in ſacred criticiſm, was publiſhed at Amſterdam in 1751 and 1752, in two volumes folio. No man will deny that Wetſtein's *Prolegomena* diſcover profound erudition, critical penetration, and an intimate acquaintance with the Greek manuſcripts. It is a work which in many reſpects has given a new turn to ſacred criticiſm, and no man engaged in that ſtudy can diſpenſe with it. Wherever Wetſtein has delivered his ſentiments reſpecting a Greek manuſcript, which he has done leſs frequently than Mill, and indeed leſs frequently than we could have wiſhed, he ſhows himſelf an experienced and ſagacious critic. He is likewiſe more conciſe than Mill in delivering his opinion, and does not ſupport it by producing ſo great a number of readings from the manuſcript in queſtion. This conciſeneſs is the conſequence of that warmth and haſte which were peculiar to Wetſtein's character, and which have ſometimes given birth to miſtakes. The fire of his diſpoſition was likewiſe the cauſe of his advancing conjectures, in regard to the hiſtory of his manuſcripts, which exceed the bounds of probability. But the critical

Scripture. tical rules which he has delivered are perfectly juſt; and in this reſpect there is a remarkable agreement between him and his eminent predeceſſors Mill and Bengel. In regard to the Latin verſion alone they appear to differ: in Mill and Bengel it has powerful, and perhaps partial, advocates; but in Wetſtein a ſevere and ſagacious judge, who ſometimes condemns it without a cauſe. The Greek manuſcripts which confirm the readings of the Vulgate, and which he ſuppoſed had been corrupted from it, he of courſe condemned with equal ſeverity: and ſome collections of various readings which had been made by Catholics, he made no ſcruple to pronounce a forgery, ſaying, "*Timeo Danaos et dona ferentes.*" But in conſequence of his antipathy to the Vulgate, his collection of various readings is leſs perfect than it might have been.

It has been aſked, 1. Whether he has quoted his manuſcripts either falſely or imperfectly, in order to eſtabliſh his own religious opinions? or, 2. Whether his diligence and accuracy have been ſuch that we may at all times depend upon them? To the firſt of theſe queſtions there can be no other anſwer, than that Wetſtein, in his character of a critic, is perfectly honeſt. With reſpect to the ſecond, his diligence and accuracy, Michaelis thinks there is leſs reaſon to pronounce him faultleſs. But Mr Marſh has examined the examples on which Michaelis founds his aſſertion, and declares that Michaelis is miſtaken in every one of them.

The diligence of Wetſtein can ſcarcely be queſtioned by any who are acquainted with his hiſtory. He travelled into different countries, and examined with his own eyes a much greater number of manuſcripts than any of his predeceſſors. His collection of various readings amounts to *above a million;* and he has not only produced a much greater quantity of matter than his predeceſſors, but has likewiſe corrected their miſtakes. The extracts from manuſcripts, verſions, and printed editions of the Greek Teſtament, which had been quoted by Mill, are generally quoted by Wetſtein. Whenever Wetſtein had no new extracts from the manuſcripts quoted by Mill, or had no opportunity of examining them himſelf, he copied literally from Mill; but wherever Mill has quoted from printed editions, as from the margin of Robert Stephens's for inſtance, or from the London Polyglot, Wetſtein did not copy from Mill, but went to the original ſource, as appears from his having corrected many miſtakes in Mill's quotations.

In the opinion of Michaelis, there are many defects in the edition of Wetſtein, which require to be ſupplied, and many errors to be corrected. Yet ſtill it muſt be allowed to be a work of immenſe labour, and moſt valuable to thoſe engaged in ſacred criticiſm; and it is ſurpriſing, when we conſider the difficulties and labour which Wetſtein had to encounter, that his errors and imperfections are ſo few.

The propoſal of Michaelis, however, of a new collation of manuſcripts, in order to form a complete collection of various readings, is worthy the attention of the learned. In mentioning this propoſal, Michaelis turns a wiſhful eye towards Britain, the only country, he ſays, which poſſeſſes the will and the means to execute the taſk. Should a reſolution, he adds, be formed in this iſland, ſo happily ſituated for promoting the purpoſes of general knowledge, to make the undertaking a public concern, to enter into a ſubſcription, and to employ men of abilities in collating manuſcripts both at home and abroad, they would be able to do more in ten years than could otherwiſe be done in a century. And could this nation direct its attention to any object more glorious or more uſeful than in aſcertaining the text of the ſacred Scriptures, and giving to poſterity an accurate edition? Scripture.

136
Punctuation of the New Teſtament.

As the ſenſe of Scripture, as well as all other books, is affected by the punctuation, it is of importance to determine whether the ſtops or points which we find in the ſacred books were uſed by the ſacred writers, or have been inſerted by modern tranſcribers.

We are told by Montfaucon, in his *Palæographia Græca*, p. 31. that the perſon who firſt diſtinguiſhed the ſeveral parts of a period in Greek writing, by the introduction of a point, was Ariſtophanes of Byzantium, who lived under Ptolemæus Epiphanes, in the 145th Olympiad. But though points were not uſed in books before this period, they were employed in inſcriptions above 400 years before the birth of Chriſt. See *Mont. Pal. Græc.* p. 135.

Under the article PUNCTUATION we mentioned, on authority which we reckoned unqueſtionable, that the ancient manuſcripts were written without any points. We have now, however, diſcovered, from Woide's edition of the *Codex Alexandrinus*, that points are uſed in that manuſcript, though omitted in the *fac ſimile* given by Montfaucon. That they are found too in the *Codex Vaticanus*, though not frequently, is related by Birch in his *Prolegomena*, p. 14.

As the fact has not been generally known, that the ancients pointed their manuſcripts, and as it is an important and intereſting fact, we ſhall preſent our readers with the firſt ſix lines of St John's Goſpel, as they are pointed in the Alexandrian manuſcript:

ΕΝΑΡΧΗΗΝΟΛΟΓΟΣΚΑΙΟΛΟΓΟΣΗΝ
ΠΡΟΣΤΟΝΘΝ ΚΑΙΘΣΗΝΟΛΟΓΟΣ·
ΟΥΤΟΣΗΝΕΝΑΡΧΗΠΡΟΣΤΟΝΘΝ
ΠΑΝΤΑΔΙΑΥΤΟΥΕΓΕΝΕΤΟ·ΚΑΙΧΩ
ΡΙΣΑΥΤΟΥΕΓΕΝΕΤΟΟΥΔΕΕΝ·
ΟΓΕΓΟΝΕΝΕΝΑΥΤΩΖΩΗΗΝ·

Whether any points for marking the ſenſe were uſed by the apoſtles, cannot be determined; but the points now in uſe have been invented ſince.

In the fourth century, Jerome began to add the comma and colon to the Latin verſion; and they were then inſerted in many more ancient manuſcripts. In the fifth century, Euthalius a deacon of Alexandria divided the New Teſtament into lines. This diviſion was regulated by the ſenſe, ſo that each line ended where ſome pauſe was to be made in ſpeaking. And when a copyiſt was diſpoſed to contract his ſpace, and therefore crowded the lines into each other, he then placed a point where Euthalius had terminated the line. In the eighth century, the ſtroke was invented which we call a comma. In the Latin manuſcripts, Jerome's points were introduced by Paul Warnfried and Alcuin, at the command of Charlemagne. In the ninth century, the Greek note of interrogation (;) was firſt uſed. At the invention of printing the editors placed the

Scripture. points arbitrarily, probably without beſtowing the neceſſary attention; and Stephens, in particular, varied his points in every edition (D).

The meaning of many paſſages in the Scripture has been altered by falſe pointing. We ſhall produce one inſtance of this: Mat. v. 34. is commonly pointed in this manner, εγω δε λεγω υμιν, μη ομοσαι ολως· μητε εν τω ουρανω, and conſequently tranſlated, "But I ſay unto you, ſwear not at all." But if, inſtead of the colon placed after ολως, we ſubſtitute a comma, the tranſlation will be, "But I ſay to you that you ought by no means to ſwear, either by heaven, for it is his throne, or by earth, for it is his footſtool." The command of Chriſt therefore applies particularly to the abuſe of oaths among the Phariſees, who on every trivial occaſion ſwore by the heaven, the earth, the temple, the head, &c. but it implies no prohibition to take an oath in the name of the Deity on ſolemn and important occaſions.

137 Diviſion into chapters. The ancients divided the New Teſtament into two kinds of chapters, ſome longer and ſome ſhorter. This method appears to be more ancient than St Jerome, for he expunged a paſſage from the New Teſtament which makes an entire chapter. The longer kind of chapters were called *breves*, the ſhorter *capitula*. St Matthew contained, according to Jerome, 68 breves; Mark contained 48; Luke 83; and John 18. All the evangeliſts together conſiſted of 217 breves and 1126 capitula. The inventor of our modern diviſion into chapters was Hugo de S. Caro, a French Dominican friar, who lived in the 13th century.

The ancients had two kinds of verſes, one of which they called στιχοι, and the other ρηματα. The *remata* were lines which contained a certain number of letters, like our printed books, and therefore often broke off in the middle of a word. Joſephus's 20 books of Antiquities contained 60,000 of them, though in Ittiquis's edition there are only 40,000 broken lines.

Stichi were lines meaſured by the ſenſe: according to an ancient written liſt mentioned by Father Simin, there were in the New Teſtament 18,612 of theſe.

138 Diviſion into verſes. The verſes into which the New Teſtament is now divided are more modern, and an imitation of the diviſion of the Old Teſtament. Robert Stephens, the firſt inventor, introduced them in his edition in the year 1551. He made this diviſion on a journey from Lyons to Paris; and, as his ſon Henry tells us in the preface to the Concordance of the New Teſtament, he made it *inter equitandum*. This phraſe probably means, that when he was weary of riding, he amuſed himſelf with this work at his inn. Scripture.

139 Its diſadvantages. This invention of the learned printer was ſoon introduced into all the editions of the New Teſtament; and it muſt be confeſſed, that in conſulting and quoting the Scriptures, and in framing concordances for them, a ſubdiviſion into minute parts is of the greateſt utility. But all the purpoſes of utility could ſurely have been gained, without adopting the haſty and indigeſted diviſion of Stephens, which often breaks the ſenſe in pieces, renders plain paſſages obſcure, and difficult paſſages unintelligible. To the injudicious diviſion of Stephens we may aſcribe a great part of the difficulties which attend the interpretation of the New Teſtament, and a great many of thoſe abſurd opinions which have diſgraced the ages of the Reformation. For as ſeparate verſes appear to the eyes of the learned, and to the minds of the unlearned, as ſo many detached ſentences, they have been ſuppoſed to contain complete ſenſe, and they have accordingly been explained without any regard to the context, and often in direct oppoſition to it. Were any modern hiſtory or continued diſcourſe divided into fragments with as little regard to the ſenſe, we ſhould ſoon find, that as many oppoſite meanings could be forced upon them as have been forced upon the books of the New Teſtament. The diviſion into verſes has been ſtill more injurious to the Epiſtles than to the Goſpels, for there is a cloſe connection between the different parts of the Epiſtles, which the verſes entirely diſſolve. It is therefore to be wiſhed that this diviſion into verſes were laid aſide. The Scriptures ought to be divided into paragraphs, according to the ſenſe; and the figures ought to be thrown into the margin. In this way, the figures will retain their utility without their diſadvantages. Dr Campbell, in his beautiful tranſlation of the Goſpels, has adopted this method with great judgement and ſucceſs; and he who will read that tranſlation, will perceive that this ſingle alteration renders the Goſpels much more intelligible, and, we may add, more entertaining (E).

140 Meaning of the word *Goſpel*. The word ΕΥΑΓΓΕΛΙΟΝ ſignifies any joyful tidings,

(D) The reader will perceive that the account of the origin of points is different from that given under PUNCTUATION. But the beſt authors differ upon this ſubject. We ſhall perhaps reconcile the difference, by ſuppoſing that points were invented at the time here mentioned, but were not in general uſe till the time mentioned under the article PUNCTUATION.

(E) We ſhall here ſubjoin, as a curioſity, what the anonymous author terms *the Old and New Teſtament diſſected*. It contains an enumeration of all the books, chapters, verſes, words, and letters, which occur in the Engliſh Bible and Apocrypha. It is ſaid to have occupied three years of the author's life, and is a ſingular inſtance of the trifling employments to which ſuperſtition has led mankind.

The OLD and NEW TESTAMENT diſſected.

Books in the Old	- 39	in the New	- 27	Total - 66	Apocryph.
Chapters - -	929	- -	- 260	- - 1189	Chapters 183
Verſes - -	23,214	- -	- 7959	- - 31,173	Verſes 6081
Words - -	592,439	- -	181,253	- - 773,692	Words 152,185
Letters - -	2,728,100	- -	838,380	- 3,566,480	

The

Scripture. and exactly correſponds to our Engliſh word GOSPEL. In the New Teſtament this term is confined to "The glad tidings of the coming of the Meſſiah." Thus, in Mat. xi. 5. our Lord ſays, "The poor have the Goſpel preached;" that is, The coming of the Meſſiah is preached to the poor. Hence the name of *Goſpel* was given to the hiſtories of Chriſt, in which the good news of the coming of the Meſſiah, with all its joyful circumſtances, are recorded.

141 Goſpel according to St Matthew.

That the Goſpel according to Matthew was compoſed, ſays Dr Campbell, by one born a Jew, familiarly acquainted with the opinions, ceremonies, and cuſtoms of his countrymen; that it was compoſed by one converſant in the ſacred writings, and habituated to their idiom; a man of plain ſenſe, but of little or no learning, except what he derived from the Scriptures of the Old Teſtament; and finally, that it was the production of a man who wrote from conviction, and had attended cloſely to the facts and ſpeeches which he related, but who in writing entertained not the moſt diſtant view of ſetting off himſelf—we have as ſtrong internal evidence as the nature of the thing will admit, and much ſtronger than that wherein the mind ninety-nine caſes out of a hundred acquieſces.

142 Its authenticity.

That the author of this hiſtory of our bleſſed Saviour was Matthew, appears from the teſtimony of the early Chriſtians. It is atteſted by Jerome, Auguſtin, Epiphanius, and Chryſoſtom, and in ſuch a manner as ſhews that they knew the fact to be uncontroverted, and judged it to be incontrovertible. Origen, who flouriſhed in the former part of the 3d century, is alſo reſpectable authority. He is quoted by Euſebius in a chapter * wherein he ſpecially treats of Origen's account of the ſacred canon. "As I have learned (ſays Origen) *by tradition* concerning the four goſpels, which alone are received without diſpute by the whole church of God under heaven; the firſt was written by Matthew, once a publican, afterwards an apoſtle of Jeſus Chriſt, *who delivered it to the Jewiſh believers, compoſed in the Hebrew language.*" In another place he ſays, "Matthew writing for the Hebrews who expected him who was to deſcend from Abraham and David, ſays the lineage of Jeſus Chriſt, ſon of David, ſon of Abraham." It muſt be obſerved, that the Greek word παραδοσις does not exactly correſpond to the Engliſh word *tradition*, which ſignifies any thing delivered orally from age to age. Παραδοσις properly implies any thing tranſmitted from former ages, whether by oral or written teſtimony. In this acceptation we find it uſed in Scripture†: "Hold the traditions (τας παραδοσεις) which ye have been taught, *whether by word* or *our epiſtle.*" The next authority to which we ſhall have recourſe is that of Irenæus biſhop of Lyons, who had been a diſciple of Polycarp. He ſays in the only book of his extant, that "Matthew, among the Hebrews, wrote a goſpel in their own language, whilſt Peter and Paul were preaching the goſpel at Rome and founding the church there."

Scripture.

**Hiſt.* lib. vi. cap. 25.

† The ſ. ii. 15.

Euſeb. Hiſt. Eccl. lib. v. cap. 8.

To the teſtimony of theſe writers it may be objected, that, except Irenæus, they all lived in the third and fourth centuries, and conſequently their evidence is of little importance. But there is ſuch unanimity in the teſtimony, that it muſt have been derived from ſome authentic ſource. And is it fair to queſtion the veracity of reſpectable men merely becauſe we knew not from what writings they received their information? Many books which were then extant are now loſt; and how do we know but theſe might have contained ſufficient evidence? Irenæus at leaſt had the beſt opportunities of information, having been well acquainted in his youth with Polycarp, the diſciple of John; no objection can therefore be made to his evidence. But we can quote an authority ſtill nearer the times of the apoſtles. Papias biſhop of Hierapolis, in Cæſarea, who flouriſhed about A. D. 116, affirms that Matthew wrote his goſpel in the Hebrew tongue, which every one interpreted as he was able §. Papias was the companion of Polycarp, and beſides muſt have been acquainted with many perſons who lived in the time of the apoſtles. The fact therefore is fully eſtabliſhed, that Matthew, the apoſtle of our Saviour, was the author of that goſpel which is placed firſt in our editions of the New Teſtament.

§ *Euſeb. Hiſt. Eccl.* lib. iii. cap. 39.

The next ſubject of inquiry reſpects the language in which

The middle Chapter and the leaſt in the Bible is Pſalm 117.
The middle Verſe is the 8th of the 118th Pſalm.
The middle time is the 2d of Chronicles, 4th Chap. 16th Verſe.
The word *And* occurs in the Old Teſtament 35,543 times.
The ſame in the New Teſtament occurs 10,684 times.
The word *Jehovah* occurs 6855 times.

OLD TESTAMENT.

The middle Book is Proverbs.
The middle Chapter is Job 29th.
The middle Verſe is 2d Chron. 20th Chap. between 17th and 18th Verſes.
The leaſt Verſe is 1 Chron. 1ſt Chap. and 1ſt Verſe.

NEW TESTAMENT.

The middle Book is Theſſalonians 2d.
The middle Chapter is between the 13th and 14th Romans.
The middle Verſe is 17th Chap. Acts, 17th Verſe.
The leaſt Verſe is 11th Chap. John, Verſe 35.
The 21ſt Verſe of the 7th Chapter of Ezra has all the letters of the alphabet.
The 19th Chapter of 2d Kings and 37th of Iſaiah are alike.

Scripture.

143 Language in which it was written.

which it was written. This we are assured by Papias, by Irenæus, and Origen, was the Hebrew; but the truth of this fact has been disputed by Erasmus, Whitby, and others. Whitby urges the improbability that Providence would have suffered the original of this gospel to be lost, and nothing to remain but a translation. This is an argument of no force against written testimony; indeed we are always in danger of drawing false conclusions when we argue from our own opinions of the conduct of Providence: *For His ways are not as our ways, nor His thoughts as our thoughts.* But though we are forced to acknowledge that the gospel according to Matthew which we possess is a translation, it is evidently a close one; and the very circumstance that it has superseded the original, is a clear proof that it was thought equally valuable by the ancient Christians. It is necessary to remark, that the language in which the gospel according to Matthew was originally composed, and which is called Hebrew by Papias, Irenæus, and Origen, is not the same with the Hebrew of the Old Testament: it was what Jerome very properly terms Syro-Chaldaic, having an affinity to both languages, but much more to the Chaldean than to the Syrian.

144 Date,

The time when this gospel was composed has not been precisely ascertained by the learned. Irenæus says that "Matthew published his gospel when Peter and Paul were preaching at Rome." Now Paul arrived at Rome A. D. 60 or 61, and it is very probable suffered martyrdom in A. D. 65. This may be justly concluded from comparing the relation of Tacitus with that of Orosius, a writer of the fifth century. Orosius having given an account of Nero's persecution of the Christians, and of the death of the two apostles in it, adds, that it was followed by a pestilence in the city, and other disasters. And Tacitus relates that a pestilence prevailed in the city, and violent storms took place in Italy, in the year of Christ 65. Matthew's gospel was therefore written between the year 60 and 65.

Lardner's Hist. of the Apostles.

145 and design of it.

That this history was primarily intended for the use of the Jews, we have, besides historical evidence, very strong presumptions from the book itself. Every circumstance is carefully pointed out which might conciliate the faith of that nation; every unnecessary expression is avoided, which might in any way serve to obstruct it. To come to particulars, there was no sentiment relating to the Messiah with which the Jews were more strongly possessed, than that he must be of the race of Abraham, and of the family of David. Matthew, therefore, with great propriety, begins his narrative with the genealogy of Jesus. That he should be born at Bethlehem in Judea, is another circumstance in which the learned among the Jews were universally agreed. His birth in that city, with some very memorable circumstances that attended it, this historian has also taken the first opportunity to mention. Those passages in the prophets, or other sacred books, which either foretel any thing that should happen to him, or admit an allusive appellation, or were in that age generally understood to be applicable to events which respect the Messiah, are never passed over in silence by this Evangelist. The fulfilment of prophecy was always to the Jews, who were convinced of the inspiration of their sacred writings, strong evidence. Accordingly none of the Evangelists has been more careful than Matthew, that nothing of this kind should be overlooked.

Dr Campbell's Preface to Matthew's Gospel.

Scripture.

146 Distinguishing character.

That which chiefly distinguishes Matthew's writings from those of the other Evangelists, is the minute and distinct manner in which he has related many of our Lord's discourses and moral instructions. Of these his sermon on the mount, his charge to the apostles, his illustrations of the nature of his kingdom, and his prophecy on Mount Olivet, are examples. He has also wonderfully united simplicity and energy in relating the replies of his master to the cavils of his adversaries. Being early called to the apostleship, he was an eye and ear witness of most of the things which he relates. And there are circumstances which incline Dr Campbell to think that Matthew has approached as near the precise order of time in which the events happened as any of the Evangelists.

Concerning the life of the apostle Matthew we have nothing to add, as the principal circumstances in his life have already been mentioned. See MATTHEW.

The Gospel according to Matthew is cited seven times in the epistle of Barnabas, twice in the first epistle of Clemens Romanus to the Corinthians, eight times in the Shepherd of Hermas, six times in Polycarp's small epistle to the Philippians, and seven times in the smaller epistles of Ignatius. These citations may be seen at full length in *Jones's New and Full Method of settling the Canon*, with the parallel passages in the gospel according to Matthew.

147 Gospel according to St Mark.

That Mark was the author of the gospel which bears his name, and that it was the second in the order of time, is proved by the unanimous testimony of the ancient Christians. Many authorities are therefore unnecessary; we shall only mention those of Papias and Irenæus. Eusebius has preserved the following passage of Papias: "This is what was related by the elder (that is, John, not the apostle, but a disciple of Jesus); Mark being Peter's interpreter wrote exactly whatever he remembered, not indeed in the order wherein things were spoken and done by the Lord; for he was not himself a hearer or follower of our Lord; but he afterwards, as I said, followed Peter who gave instructions as suited the occasions, but not as a regular history of our Lord's teaching. Mark, however, committed no mistake in writing such things as occurred to his memory: for of this one thing he was careful, to omit nothing which he had heard, and to insert no falsehood into his narrative." Such is the testimony of Papias, which is the more to be regarded as he assigns his authority. He spake not from hearsay, but from the information which he had received from a most credible witness, John the elder, or presbyter, a disciple of Jesus, and a companion of the apostles.

148 Its authenticity.

Hist. Eccl. lib. iii. cap. 39.

149 and date.

Irenæus, after telling us that Matthew published his gospel whilst Peter and Paul were preaching at Rome, adds: "After their departure (ἐξοδον), Mark also, the disciple and interpreter of Peter, delivered to us in writing the things which had been preached by Peter." The Greek ἐξοδος, like the English word *departure*, may either denote death, which is a departure out of the world, or mean a departure out of the city. It is probably in the former of these senses it is here used. Yet by the accounts given by some others, Mark's gospel was published in Peter's lifetime, and had his approbation.

Adv. Haer. lib. iii. cap. 1.

Scripture. approbation. The gospel of Mark is supposed to be but two years posterior in date to that of Matthew. The precise year, however, cannot be determined with certainty; and it is a matter of no importance, since we have ascertained the author and the time in which he lived.

Mark has generally been supposed to be the same person who is mentioned in the acts and some of Paul's epistles, who is called John, and was the nephew of Barnabas. But as this person was the attendant of Paul and Barnabas, and is nowhere in scripture said to have accompanied Peter in his apostolical mission, which ancient writers inform us the author of the gospel did, Dr Campbell has justly concluded that these were different persons. The author of the gospel is certainly meant by Peter when he says *Marcus my son saluteth you* *.

Preface to Mark.

* 1 Pet v. 13.

150 Language in which it was written.

That Mark wrote his gospel in Greek, is as evidently conformable to the testimony of antiquity, as that Matthew wrote his in Hebrew or Syro Chaldaic. The cardinals Baronius and Bellarmine, anxious to exalt the language in which the vulgate was written, have maintained that this Evangelist published his work in Latin. The only appearance of testimony which has been produced in support of this opinion is the inscription subjoined to this gospel in Syriac, and in some other oriental versions. But these postscripts are not the testimonies of the translators: they proceed from the conjecture of some transcriber; but when written, or by whom, is equally unknown. Against positive testimony therefore they are entitled to no credit.

151 Design of it.

From the Hebraisms in the style, we should readily conclude that the author was by birth and education a Jew. There are also expressions which show that he had lived for some time among the Latins, as κεντυριων, "centurion," and σπεκυλατωρ, "sentinel;" words which do not occur in the other gospels. There are other internal evidences that this gospel was written beyond the confines of Judea. The first time the Jordan is metioned, ποταμος, "river," is added to the name for explanation; for though no person in Judea needed to be informed that Jordan was a river, the case was different in distant countries. The word *Gehenna*, which is translated *Hell* in the New Testament, originally signified the *Valley of Hinnom*, where infants had been sacrificed by fire to Moloch, and where a continual fire was afterwards kept up to consume the filth of Jerusalem. As this word could not have been understood by a foreigner, the Evangelist adds, by way of explanation, πυρ το ασβεστον, "the unquenchable fire." Instead of the word *Mammon*, he uses the common term χρηματα "riches." When he employs the oriental word *Corbon*, he subjoins the interpretation ὁ εστι δωρον, "that is, a gift." These peculiarities will corroborate the historical evidence that has been already mentioned, that Mark intended his gospel for the use of the Gentiles.

Dr Campbell's Preface to Mark's Gospel.

152 Mark not the abridger of Matthew,

It has been affirmed that this evangelist is the abridger of Matthew. It is true that Mark sometimes copies the expressions used by Matthew; but he is not to be considered as a mere abridger, for he omits altogether several things related by Matthew, viz. our Lord's pedigree, his birth, the visit of the Magians, Joseph's flight into Egypt, and the cruelty of Herod. Dr Lardner has given a list of thirty-three passages, wherein circumstances are related which are omitted by the other evangelists. There is one parable, and an account of two miracles peculiar to Mark. The parable or similitude is mentioned in chap. iv. 26. One of these miracles was the curing of a deaf and dumb man, chap. vii. 31, 37. The other was the giving sight to a blind man at Bethsaida, chap. viii. 22, 26. The style of Mark, instead of being more concise than that of Matthew, is more diffuse. That he had read Matthew's gospel cannot be doubted, but that he abridged it, is a mistake. Scripture.

153 but derived his information from Peter.

According to the testimony which has been already produced, Mark derived his information from the apostle Peter. It would be improper, therefore, not to remark, that this evangelist has omitted many things tending to Peter's honour, which are related in the other gospels, and has given the most particular account of Peter's fall. This gospel is seven times cited by Irenæus, and nine times by Tertullian.

154 Gospel according to St Luke.

That the author of the gospel which is the third in order was Luke, the companion of the apostle Paul, is evident from the testimonies of Irenæus, Clemens of Alexandria, Origen, Tertullian, and many succeeding writers. But it has been disputed whether he was a Jew or a Gentile. That Luke was a Jew by birth, or at least by religion, may be argued from his being a constant companion of Paul. If he had been an uncircumcised Gentile, exceptions would have been made to him, especially at Jerusalem; but nothing of that kind appears. It is also rendered highly probable, from his mode of computing time by the Jewish festivals, and from his frequent use of the Hebrew idiom. It has been supposed that Luke was one of the 70 disciples; but he does not pretend to have been a witness of our Lord's miracles and teaching; on the contrary, he tells us in his introduction, that he received his information from others.

155 Design of it.

The design of Luke in writing his gospel was to supersede some imperfect and inaccurate histories of our Saviour, which had then been published. What these were, it is impossible now to determine, as they are not mentioned by any contemporary writer, and probably did not survive the age in which they were composed.

156 From what source of information it was derived.

It has been supposed that Luke chiefly derived his information from the apostle Paul, whom he faithfully attended in his travels; but, from Luke's own words, we are led to conclude, that the principal source of his intelligence, as to the facts related in the gospel, was from those who had been eye and ear witnesses of what our Lord both did and taught. Now Paul evidently was not of this number. It was from conversing with some of the twelve apostles or disciples of our Lord, who heard his discourses and saw his miracles, that he obtained his information.

As to the time when this gospel was written, we have hardly any thing but conjecture to guide us. But as Origen, Eusebius, and Jerome, have ranged it after those of Matthew and Mark, we have no reason to doubt but they were written in the same order.

157 Has supplied many omissions of the two former gospels.

The gospel by Luke has supplied us with many interesting particulars which had been omitted both by Matthew and Mark. It has given a distinct narration of the circumstances attending the birth of John the Baptist and the nativity of our Saviour. It has given

an

Scripture.

Dr Campbell's Preface to Luke's Goſpel.

an account of ſeveral memorable incidents and cures which had been overlooked by the reſt; the converſion of Zaccheus the publican; the cure of the woman who had been bowed down for 18 years; the cure of the dropſical man; the cleanſing of the ten lepers; the inhoſpitable treatment of our Saviour by the Samaritans, and the inſtructive rebuke which he gave on that occaſion to two of his diſciples for their intemperate zeal; alſo the affecting interview which he had after his reſurrection with two of his diſciples. Luke has alſo added many edifying parables to thoſe which the other evangeliſts had recorded. Moſt of theſe are ſpecified by Irenæus as particularly belonging to this goſpel, and has thereby ſhown to us, without intending it, that the goſpel of Luke was the ſame in his time that it is at preſent.

158 Style and compoſition of it.

The ſtyle of this evangeliſt abounds as much with Hebraiſms as any of the ſacred writings, but it contains more of the Grecian idiom than any of them. It is alſo diſtinguiſhed by greater variety and copiouſneſs; qualities which may be juſtly aſcribed to the ſuperior learning of the author. His occupation as a phyſician would naturally induce him to employ ſome time in reading, and give him eaſier acceſs to the company of the great than any of the other evangeliſts. As an inſtance of Luke's copiouſneſs, Dr Campbell has remarked that each of the evangeliſts has a number of words which are uſed by none of the reſt; but in Luke's goſpel the number of ſuch peculiarities or words, uſed in none of the other goſpels, is greater than that of the peculiar words found in all the three other goſpels put together; and that the terms peculiar to Luke are for the moſt part long and compound words. The ſame judicious writer has alſo obſerved, that there is more of compoſition in Luke's ſentences than is found in the other three, and conſequently leſs ſimplicity. Of this the very firſt ſentence is an example, which occupies no leſs than four verſes. Luke, too, has a greater reſemblance to other hiſtorians, in giving what may be called his own verdict in the narrative part of this work; a freedom which the other evangeliſts have ſeldom or never ventured to uſe. He calls the Phariſees *lovers of money;* in diſtinguiſhing Judas Iſcariot from the other Judas, he uſes the phraſe, *he who proved a traitor*, (ος και εγενετο προδοτης). Matthew and Mark expreſs the ſame ſentiment in milder language, "he who delivered him up." In recording the moral inſtructions of our Lord, eſpecially his parables, this evangeliſt has united an affecting ſweetneſs of manner with genuine ſimplicity.

Chap. xvi. 14.

159 Cited by ancient Chriſtian authors.

This goſpel is frequently cited by Clemens Romanus, the contemporary of the Apoſtles, by Ignatius, and Juſtin Martyr. Irenæus has made above a hundred citations from it. In his lib. iii. *adv. Hæreſ.* c. 14. he vindicates the authority and perfection of Luke's goſpel, and has produced a collection of thoſe facts which are only recorded by this evangeliſt.

160 Goſpel according to John.

That the goſpel which is placed laſt in our editions of the New Teſtament was written by John, one of our Saviour's apoſtles, is confirmed by the unanimous teſtimony of the ancient Chriſtians. He was the ſon of Zebedee, a fiſherman of Bethſaida in Galilee, by his wife Salome, and the brother of James, ſurnamed the elder or greater. He was the beloved diſciple of our Saviour, and was honoured, along with Peter and James, with many marks of diſtinction which were not conferred on the other diſciples. He poſſeſſed a high degree of intrepidity and zeal, a warm and affectionate heart, and was ſtrongly attached to his maſter. His brother James and he were honoured with the title of Boanerges, or *Sons of Thunder*. He was anxious to reſtrain whatever he conſidered as a mark of diſreſpect againſt his maſter, and to puniſh his enemies with ſeverity. He was incenſed againſt ſome perſons for attempting to caſt out demons in the name of Jeſus; and required them to deſiſt becauſe they were not his diſciples. James and he propoſed to our Saviour to call down fire from heaven to puniſh the inhoſpitable Samaritans. Nor was the courage of John leſs ardent than his zeal. When Peter had diſowned his Lord, and all the other diſciples had fled, John continued to attend his maſter. He was preſent at his trial, and followed him to the croſs, where he was a ſpectator of his ſufferings and death. The interview between Jeſus and this diſciple at Calvary, though conciſely related, is an event which will ſtrongly affect every man of feeling, while it convinces him of the unalterable affection of Jeſus to his beloved diſciple, as well as diſcovers his reſpectful tenderneſs for his mother. See JOHN.

Scripture.

161 Motives for writing it.

The ancients inform us, that there were two motives which induced John to write his goſpel: the one, that he might refute the hereſies of Cerinthus and the Nicolaitans, who had attempted to corrupt the Chriſtian doctrine; the other motive was, that he might ſupply thoſe important events in the life of our Saviour which the other evangeliſts had omitted. Of the former of theſe motives Irenæus gives us the following account: "John, deſirous to extirpate the errors ſown in the minds of men by Cerinthus, and ſome time before by thoſe called Nicolaitans, publiſhed his goſpel; wherein he acquaints us that there is one God, who made all things by his word, and not, as they ſay, one who is the Creator of the world, and another who is the father of the Lord; one the ſon of the Creator, and another the Chriſt, from the ſuperceleſtial abodes who deſcended upon Jeſus, the ſon of the Creator, but remained impaſſible, and afterwards fled back into his own pleroma or fulneſs." As Irenæus is the moſt ancient author who has written upon this ſubject, many appeals have been made to his authority. The authority of Irenæus is certainly reſpectable, and we have often referred to his teſtimony with confidence; but we think it neceſſary to make a diſtinction between receiving his teſtimony to a matter of fact, and implicitly adopting his opinion. He does not tell us, that he derived his information from any preceding writer, or indeed from any perſon at all. Nay, he ſeems to have believed that John wrote againſt theſe hereſies by a prophetic ſpirit; for he ſays in another place, chap. xx. 30. "As John the diſciple of our Lord aſſures us, ſaying, But theſe are written, that ye might believe that Jeſus is the Chriſt, the Son of God, and that believing ye might have life through his name; *FORESEEING theſe blaſphemous notions that divide the Lord, ſo far as it is in their power.*"

162 Not to confute heretics.

Indeed it ſeems very improbable that an apoſtle ſhould write a hiſtory of our Lord on purpoſe to confute the wild opinions of Cerinthus or any other heretic. Had John conſidered ſuch a confutation neceſſary, it is more likely that he would have introduced it into

Scripture. into an epiſtle than blended it with the actions of his venerable Maſter. But were the opinion of Irenæus well-founded, we ſhould ſurely diſcover ſome traces of it in the goſpel of John; yet except in the introduction, there is nothing that can with the leaſt ſhadow of probability be applied to the opinions of Cerinthus; and few, we preſume, will affirm, that the goſpel of John was compoſed merely for the ſake of the firſt eighteen verſes.

163 But to prove that Jeſus was the Meſſiah the Son of God.

The intention of John in writing his goſpel was far more extenſive and important than to refute the opinions of a few men who were to ſink into oblivion in the courſe of a few centuries. It was evidently (according to the opinion of Clemens of Alexandria) to ſupply the omiſſions of the other evangeliſts: It was to exhibit the evidences of the Chriſtian religion in a diſtinct and perſpicuous manner: It was, as he himſelf in the concluſion of his goſpel aſſures us, to convince his readers, * John xv. 31. *that Jeſus is the Meſſiah, the Son of God, and that believing they might have life through his name**. Now it will appear to any perſon who reads this goſpel with attention, that he has executed his plan with aſtoniſhing ability, and has given the moſt circumſtantial and ſatisfactory evidence that Jeſus was the Meſſiah the Son of God. After declaring the pre-exiſtence of Jeſus, he proceeds to deliver the teſtimony of John the Baptiſt, and ſelects ſome of the greateſt miracles of Jeſus to prove his divine miſſion. In the fifth chapter he preſents us with a diſcourſe which our Saviour delivered in the temple in the preſence of the Jews, wherein he ſtates in a very diſtinct manner the proofs of his miſſion from, 1. The teſtimony of John; 2. His own miracles; 3. The declaration of the Father at his baptiſm; 4. The Jewiſh Scriptures. Indeed the concluſion that Jeſus was the Meſſiah the Son of God, naturally ariſes from almoſt every miracle which our Saviour is ſaid to have performed, and from every diſcourſe that he delivered. This declaration is very often made by our Saviour himſelf; particularly to the woman of Samaria, to Nicodemus, and to the blind man whom he had cured.

164 Is a ſupplement to the other three goſpels.

It muſt be evident to every reader, that John ſtudiouſly paſſes over thoſe paſſages in our Lord's hiſtory and teaching which had been treated at large by the other evangeliſts, or, if he mentions them at all, he mentions them ſlightly. This confirms the teſtimony of ancient writers, that the firſt three goſpels were written and publiſhed before John compoſed his goſpel. Except the relation of our Saviour's trial, death, and reſurrection, almoſt every thing which occurs in this book is new. The account of our Saviour's nativity, of his baptiſm, and of his temptation in the wilderneſs, is omitted; nor is any notice taken of the calling of the twelve apoſtles, or of their miſſion during our Saviour's life. It is remarkable, too, that not one parable is mentioned, nor any of the predictions relating to the deſtruction of Jeruſalem. All the miracles recorded by the other evangeliſts are paſſed over, except the miraculous ſupply of proviſion, by which five thouſand were fed: and it is probable that this miracle was related for the ſake of the diſcourſe to which it gave birth. The other miracles which are mentioned are few in number, but in general they are minutely detailed. They conſiſt of theſe: the turning of water into wine at Cana; the cure of the diſeaſed man at the pool of Bethesda; the cure of the man that had been blind from his birth; the reſtoring of Lazarus to life; and the healing of the ſervant's ear which Peter had cut off. But valuable would this goſpel be, though it had only recorded the conſolation of Jeſus to his diſciples previous to his departure; which exhibits a moſt admirable view of our Saviour's character, of his care and tender regard for his diſciples. Having opened every ſource of comfort to their deſponding minds; exhorted them to mutual love, and to the obedience of his Father's precepts; having warned them of the impending dangers and ſorrows—our Saviour concludes with a prayer, in the true ſpirit of piety and benevolence; ardent without enthuſiaſm, ſober and rational without lukewarmneſs. Scripture.

Dr Campbell's Preface to John's Goſpel.

165 Time at which it was written.

The time in which this goſpel was written has not been fixed with any preciſion. Irenæus informs us, that it was written at Epheſus, but leaves us to conjecture whether it was written before or after John's return from Patmos. He was baniſhed to Patmos by Domitian, who reigned 15 years, and according to the beſt computation died A. D. 96. The perſecution which occaſioned the exile of John commenced in the 14th year of Domitian's reign. If John wrote his goſpel after his return to Epheſus, which is affirmed by Epiphanius to have been the caſe, we may fix the date of it about the year 97 (F).

166 Style of it.

This goſpel is evidently the production of an illiterate Jew, and its ſtyle is remarkable for ſimplicity. It abounds more with Hebraiſms than any of the other goſpels; and contains ſome ſtrong oriental figures which are not readily underſtood by an European.

167 Often quoted by ancient Chriſtians.

This goſpel is cited once by Clemens Romanus, by Barnabas three times, by Ignatius five times, by Juſtin Martyr ſix times, by Irenæus, and above forty times by Clemens Alexandrinus.

168 Acts of the apoſtles.

The book which we intitle the Acts of the Apoſtles connects the goſpels and the epiſtles. It is evidently a continuation of Luke's goſpel, which appears both from the introduction and from the atteſtations of ancient Chriſtians. Both are dedicated to Theophilus; and in the beginning of the Acts a reference is made to his goſpel, which he calls *a former treatiſe*, recording the actions and diſcourſes of Jeſus till his aſcenſion to heaven. Luke is mentioned as the author of the Acts of the Apoſtles by Irenæus, by Tertullian, by Origen, and Euſebius.

From the frequent uſe of the firſt perſon plural, it is manifeſt that Luke the author was preſent at many of

(F) It has been argued from a paſſage in this goſpel, that it muſt have been written before the deſtruction of Jeruſalem. In ſpeaking of the pool of Bethesda, John uſes the preſent tenſe: His words are, "There *is* at Jeruſalem." Now if theſe words had been written after the deſtruction of Jeruſalem, it is urged the paſt tenſe would have been uſed, and not the preſent. This argument is more ſpecious than forcible. Though Jeruſalem was demoliſhed, does it follow that the pool of Bethesda was dried up?

Scripture. the tranſactions which he relates. He appears to have accompanied Paul from Troas to Philippi. He attended him alſo to Jeruſalem, and afterwards to Rome, where he remained for two years. He is mentioned by Paul in ſeveral of thoſe epiſtles which were written from Rome, particularly in the 2d epiſtle to Timothy, and in the epiſtle to Philemon.

This book contains the hiſtory of the Chriſtian church for the ſpace of about 28 or 30 years, from the time of our Saviour's aſcenſion to Paul's arrival at Rome in the year 60 or 61. As it informs us that Paul reſided two years in Rome, it muſt have been written after the year 63; and as the death of Paul is not mentioned, it is probable it was compoſed before that event, which happened A. D. 65.

169 Contents of that book. The Acts of the Apoſtles may be divided into ſeven parts. 1. The account of our Saviour's aſcenſion, and of the occurrences which happened on the firſt Penteceſt after that event, contained in chap. i. ii. 2. The tranſactions of the Chriſtians of the circumciſion at Jeruſalem, in Judea, and Samaria, chap. iii.—ix. xi. 1—21. xii. 3. Tranſactions in Cæſarea, and the admiſſion of the Gentiles, chap. x. 4. The firſt circuit of Barnabas and Paul among the Gentiles, chap. xi. 22. xiii. xiv. 5. Embaſſy to Jeruſalem, and the firſt council held in that city, chap. xv. 6. Paul's ſecond journey, chap. xvi.—xxi. 7. His arreſtment, trial, appeal to Cæſar, and journey to Rome, chap. xxi. to the end of the book.

170 Often cited by the early Chriſtians. The Acts of Apoſtles are cited by Clemens Romanus, by Polycarp, by Juſtin Martyr, thirty times by Irenæus, and ſeven times by Clemens Alexandrinus.

171 The epiſtles. All the eſſential doctrines and precepts of the Chriſtian religion were certainly taught by our Saviour himſelf, and are contained in the goſpels. The epiſtles may be conſidered as commentaries on the doctrines of the goſpel, addreſſed to particular ſocieties, accommodated to their reſpective ſituations; intended to refute the errors and falſe notions which prevailed among them, and to inculcate thoſe virtues in which they were moſt deficient.

172 General plan of them. The plan on which theſe LETTERS are written is, firſt, to decide the controverſy, or refute the erroneous notions which had ariſen in the ſociety to which the epiſtle was addreſſed: And, ſecondly, to recommend thoſe duties which their falſe doctrines might induce them to neglect; at the ſame time inculcating in general exhortations the moſt important precepts of Chriſtian morality.

173 Arranged in chronological order. Of the epiſtles fourteen were written by St Paul. Theſe are not placed according to the order of time in which they were compoſed, but according to the ſuppoſed precedence of the ſocieties or perſons to whom they were addreſſed. It will be proper therefore to exhibit here their chronological order according to Dr Lardner.

A TABLE of St PAUL'S EPISTLES, with the Places where, and times when, written, according to Dr Lardner.

Epiſtles.	Places.	A. D.
1 Theſſalonians	Corinth	52
2 Theſſalonians	Corinth	52
Galatians	Corinth or Epheſus	near the end of 52 or beginning of 53
1 Corinthians	Epheſus	the beginning of 53
1 Timothy	Macedonia	56
Titus	Macedonia or near it	bef. the end of 56
2 Corinthians	Macedonia	about October 57
Romans	Corinth	about February 58
Epheſians	Rome	about April 61
2 Timothy	Rome	about May 61
Philippians	Rome	bef. the end of 62
Coloſſians	Rome	bef. the end of 62
Philemon	Rome	bef. the end of 62
Hebrews	Rome or Italy	in Spring of 63

A TABLE of the CATHOLIC EPISTLES, and the REVELATION, according to Dr Lardner.

Epiſtle.	Place.	A. D
James	Judea	61 or beg. of 62
The two Epiſtles of Peter	Rome	64
1 John	Epheſus	about 80
2d and 3d of John	Epheſus	between 80 and 90
Jude	Unknown	64 or 65
Revelation	Patmos or Epheſus	95 or 96

174 Cauſes of their obſcurity. It is more difficult to underſtand the epiſtolary writings than the goſpels; the cauſe of which is evident. Many things are omitted in a letter, or ſlightly mentioned, becauſe ſuppoſed to be known by the perſon to whom it is addreſſed. To a ſtranger this will create much difficulty. The buſineſs about which St Paul wrote was certainly well known to his correſpondents; but at this diſtance of time we can obtain no information concerning the occaſion of his writing, of the character and circumſtances of thoſe perſons for whom his letters were intended, except what can be gleaned from the writings themſelves. It is no wonder, therefore, though many alluſions ſhould be obſcure. Beſides, it is evident from many paſſages that he anſwers letters and queſtions which his correſpondents had ſent him. If theſe had been preſerved, they would have thrown more light upon many things than all the notes and conjectures of the commentators.

175 Cauſes of obſcurity peculiar to St Paul's epiſtles. The cauſes of obſcurity which have been now mentioned are common to all the writers of the epiſtles; but there are ſome peculiar to St Paul. 1. As he had an acute and fertile mind, he ſeems to have written with great rapidity, and without attending much to the common rules of method and arrangement. To this cauſe we may aſcribe his numerous and long parentheſes. In the heat of argument he ſometimes breaks off abruptly to follow out ſome new thought; and when he has exhauſted it, he returns from his digreſſion without informing his readers; ſo that it requires great attention to retain the connection. 2. His frequent change of perſon, too, creates ambiguity: by the pronoun *I* he ſometimes means himſelf; ſometimes any Chriſtian; ſometimes a Jew, and ſometimes any man. In uſing the pronoun WE he ſometimes intends himſelf; ſometimes comprehends his companions; ſometimes the apoſtles;

Scripture. tles; at one time he alludes to the converted Jews, at another time to the converted Gentiles. 3. There is a third cauſe of obſcurity; he frequently propoſes objections, and anſwers them without giving any formal intimation. There are other difficulties which ariſe from our uncertainty who are the perſons he is addreſſing, and what are the particular opinions and practices to which he refers. To theſe we may add two external cauſes, which have increaſed the difficulty of underſtanding the epiſtles. 1. The dividing them into chapters and verſes, which diſſolves the connection of the parts, and breaks them into fragments. If Cicero's epiſtles had been ſo disjointed, the reading of them would be attended with leſs pleaſure and advantage, and with a great deal more labour. 2. We are accuſtomed to the phraſeology of the epiſtles from our infancy; but we have either no idea at all when we uſe it, or our idea of it is derived from the articles or ſyſtem which we have eſpouſed. But as different ſects have arbitrary definitions for St Paul's phraſes, we ſhall never by following them diſcover the meaning of St Paul, who certainly did not adjuſt his phraſeology to any man's ſyſtem.

The beſt plan of ſtudying the epiſtles is that which was propoſed and executed by Mr Locke. This we ſhall preſent to our readers in the words of that acute and judicious author.

176 Mr Locke's plan of ſtudying the epiſtles.

"After I had found by long experience, that the reading of the text and comments in the ordinary way proved not ſo ſucceſsful as I wiſhed to the end propoſed, I began to ſuſpect that in reading a chapter as was uſual, and thereupon ſometimes conſulting expoſitors upon ſome hard places of it, which at that time moſt affected me, as relating to points then under conſideration in my own mind, or in debate againſt others, was not a right method to get into the true ſenſe of theſe epiſtles. I ſaw plainly, after I began once to reflect on it, that if any one ſhould write me a letter as long as St Paul's to the Romans, concerning ſuch a matter as that is, in a ſtyle as foreign, and expreſſions as dubious as his ſeem to be, if I ſhould divide it into fifteen or ſixteen chapters, and read one of them to-day, and another to-morrow, &c. it is ten to one I ſhould never come to a full and clear comprehenſion of it. The way to underſtand the mind of him that writ it, every one would agree, was to read the whole letter through from one end to the other all at once, to ſee what was the main ſubject and tendency of it: or if it had ſeveral views and purpoſes in it, not dependent one of another, nor in a ſubordination to one chief aim and end, to diſcover what thoſe different matters were, and where the author concluded one, and began another; and if there were any neceſſity of dividing the epiſtle into parts, to make the boundaries of them.

"In the proſecution of this thought, I concluded it neceſſary, for the underſtanding of any one of St Paul's epiſtles, to read it all through at one ſitting, and to obſerve as well as I could the drift and deſign of his writing it. If the firſt reading gave me ſome light, the ſecond gave me more; and ſo I perſiſted on reading conſtantly the whole epiſtle over at once till I came to have a good general view of the apoſtle's main purpoſe in writing the epiſtle, the chief branches of his diſcourſe wherein he proſecuted it, the arguments he uſed, and the diſpoſition of the whole.

"This, I confeſs, is not to be obtained by one or two haſty readings; it muſt be repeated again and again with a cloſe attention to the tenor of the diſcourſe, and a perfect neglect of the diviſions into chapters and verſes. On the contrary, the ſafeſt way is to ſuppoſe that the epiſtle has but one buſineſs and one aim, till by a frequent peruſal of it you are forced to ſee there are diſtinct independent matters in it, which will forwardly enough ſhow themſelves. Scripture.

"It requires ſo much more pains, judgement, and application, to find the coherence of obſcure and abſtruſe writings, and makes them ſo much the more unfit to ſerve prejudice and preoccupation when found; that it is not to be wondered that St Paul's epiſtles have with many paſſed rather for disjointed, looſe, pious diſcourſes, full of warmth and zeal, and overflows of light, rather than for calm, ſtrong, coherent reaſonings, that carried a thread of argument and conſiſtency all through them."

Mr Locke tells us he continued to read the ſame epiſtle over and over again till he diſcovered the ſcope of the whole, and the different ſteps and arguments by which the writer accompliſhes his purpoſe. For he was convinced before reading his epiſtles, that Paul was a man of learning, of ſound ſenſe, and knew all the doctrines of the goſpel by revelation. The ſpeeches recorded in the Acts of the Apoſtles convinced this judicious critic that Paul was a cloſe and accurate reaſoner: and therefore he concluded that his epiſtles would not be written in a looſe, confuſed, incoherent ſtyle. Mr Locke accordingly followed the chain of the apoſtle's diſcourſe, obſerved his inferences, and carefully examined from what premiſes they were drawn, till he obtained a general outline of any particular epiſtle. If every divine would follow this method, he would ſoon acquire ſuch a knowledge of Paul's ſtyle and manner, that he would peruſe his other Epiſtles with much greater eaſe.

177 Epiſtle to the Romans.

That the Epiſtle to the Romans was written at Corinth by St Paul, is aſcertained by the teſtimony of the ancient Chriſtians. It was compoſed in the year 58, in the 24th year after Paul's converſion, and is the ſeventh epiſtle which he wrote. From the Acts of the Apoſtles we learn that it muſt have been written within the ſpace of three months; for that was the whole period of Paul's reſidence in Greece, (Acts xx. 1, 2, 3.)

178 Its date.

The following analyſis of this epiſtle we have taken from a valuable little treatiſe, intitled A Key to the New Teſtament, which was written by Dr Percy biſhop of Dromore. It exhibits the intention of the apoſtle, and the arguments which he uſes to prove his different propoſitions, in the moſt conciſe, diſtinct, and connected manner, and affords the beſt view of this Epiſtle that we have ever ſeen.

179 General deſign

"The Chriſtian church at Rome appears not to have been planted by any apoſtle; wherefore St Paul, leſt it ſhould be corrupted by the Jews, who then ſwarmed in Rome, and of whom many were converted to Chriſtianity, ſends them an abſtract of the principal truths of the goſpel, and endeavours to guard them againſt thoſe erroneous notions which the Jews had of juſtification, and of the election of their own nation.

"Now the Jews aſſigned three grounds for juſtification. Firſt, 'The extraordinary piety and merits of their anceſtors, and the covenant made by God with theſe holy men.' They thought God could not hate the chil-

Scripture. dren of such meritorious parents; and as he had made a covenant with the patriarchs to bless their posterity, he was obliged thereby to pardon their sins.' Secondly, 'A perfect knowledge and diligent study of the law of Moses.' They made this a plea for the remission of all their sins and vices. Thirdly, 'The works of the Levitical law,' which were to expiate sin, especially circumcision and sacrifices. Hence they inferred that the Gentiles must receive the whole law of Moses, in order to be justified and saved.

"The doctrine of the Jews concerning election was, 'That as God had promised to Abraham to bless his seed, to give him not only spiritual blessings, but also the land of Canaan, to suffer him to dwell there in prosperity, and to consider him as his church upon earth:' That therefore this blessing extended to their whole nation, and that God was bound to fulfil these promises to them, whether they were righteous or wicked, faithful or unbelieving. They even believed that a prophet ought not to pronounce against their nation the prophecies with which he was inspired; but was rather to beg of God to expunge his name out of the book of the living.

"These previous remarks will serve as a key to unlock this difficult Epistle, of which we shall now give a short analysis. See *Michaelis's Lectures on the New Testament.*

180 and analysis of it.

"I. The Epistle begins with the usual salutation with which the Greeks began their letters, (chap. i. 1—7.)

"II. St Paul professes his joy at the flourishing state of the church at Rome, and his desire to come and preach the gospel (ver. 8—19.): then he insensibly introduces the capital point he intended to prove, viz.

"III. The subject of the gospel (ver. 16, 17.), that it reveals a righteousness unknown before, which is derived solely from faith, and to which Jews and Gentiles have an equal claim.

"IV. In order to prove this, he shows (chap. i. 18.—iii. 20.) that both Jews and Gentiles are 'under sin,' i. e. that God will impute their sins to Jews as well as to Gentiles.

"His arguments may be reduced to these syllogisms (chap. ii. 17—24.) 1. 'The wrath of God is revealed against those who hold the truth in unrighteousness; i. e. who acknowledge the truth, and yet sin against it. 2. The Gentiles acknowledged truths; but, partly by their idolatry, and partly by their other detestable vices, they sinned against the truth they acknowledged. 3. Therefore the wrath of God is revealed against the Gentiles, and punisheth them. 4. The Jews have acknowledged more truths than the Gentiles, and yet they sin. 5. Consequently the Jewish sinners are yet more exposed to the wrath of God (ch. ii. 1—12. Having thus proved his point, he answers certain objections to it. *Obj.* 1. 'The Jews were well grounded in their knowledge, and studied the law.' He answers, If the knowledge of the law, without observing it, could justify them, then God could not have condemned the Gentiles, who knew the law by nature, (ch. ii. 13—16.) *Obj.* 2. 'The Jews were circumcised.' *Anf.* That is, ye are admitted by an outward sign into the covenant with God. This sign will not avail you when ye violate that covenant (ch. ii. 25. to the end). *Obj.* 3. 'According to this doctrine of St Paul, the Jews have no advantage before others.' *Anf.* Yes, they still have advantages; for unto them are committed the oracles of God. But their privileges do not extend to this, that God should overlook their sins, which, on the contrary, Scripture condemns even in the Jews (ch. iii. 1—19.). *Obj.* 4. 'They had the Levitical law and sacrifices.' *Anf.* From hence is no remission, but only the knowledge of sin. (ch. iii. 20.). Scripture.

"V. From all this St Paul concludes, that Jews and Gentiles may be justified by the same means, namely, without the Levitical law, through faith in Christ: And in opposition to the imaginary advantages of the Jews, he states the declaration of Zechariah, that God is the God of the Gentiles as well as of the Jews, (ch. iii. 21. to the end.

"VI. As the whole blessing was promised to the faithful descendents of Abraham, which both Scripture and the Jews call his children, he proves his former assertion from the example of Abraham; who was an idolater before his call, but was declared just by God, on account of his faith, long before his circumcision. Hence he takes occasion to explain the nature and fruits of faith, (ch. iv. 1. v. 11.).

"VII. He goes on to prove from God's justice, that the Jews had no advantages over the Gentiles with respect to justification. Both Jews and Gentiles had forfeited life and immortality, by the means of one common father of their race, whom they themselves had not chosen. Now as God was willing to restore immortality by a new spiritual head of a covenant, viz. Christ, it was just that both Jews and Gentiles should share in this new representative of the whole race (ch. v. 12. to the end).—Chap. v. ver. 15, 16. amounts to this negative question, 'Is it not fitted that the free gift should extend as far as the offence?'

"VIII. He shows that the doctrine of justification, as stated by him, lays us under the strongest obligations of holiness, (ch. vi. 1. to the end).

"IX. He shows that the law of Moses no longer concerns us at all; for our justification arises from our appearing in God's sight, as if actually dead with Christ on account of our sins; but the law of Moses was not given to the dead. On this occasion he proves at large, that the eternal power of God over us is not affected by this; and that whilst we are under the law of Moses we perpetually become subject to death, even by sins of inadvertency, (ch. vii. 1. to the end).

"X. Hence he concludes, that all those, and those only, who are united with Christ, and for the sake of his union, do not live according to the flesh, are free from all condemnation of the law, and have an undoubted share in eternal life, (ch. viii. 1.—17.).

"XI. Having described their blessedness, he is aware that the Jews, who expected a temporal happiness, should object to him, that Christians notwithstanding endure much suffering in this world. He answers this objection at large, (ch. viii. 18 to the end).

"XII. He shows that God is not the less true and faithful, because he doth not justify, but rather rejects and punishes, those Jews who would not believe the Messiah, (ch. ix. x. xi.). In discussing this point, we may observe the cautious manner in which, on account of the Jewish prejudices, he introduces it (ch. ix. 1.—5.), as well as in the discussion itself.

"He shows that the promises of God were never made to all the posterity of Abraham, and that God always

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ways reſerved to himſelf the power of chooſing thoſe ſons of Abraham whom, for Abraham's ſake, he intended to bleſs, and of puniſhing the wicked ſons of Abraham; and that with reſpect to temporal happineſs or miſery, he was not even determined in his choice by their works. Thus he rejected Iſhmael, Eſau, the Iſraelites in the deſert in the time of Moſes, and the greater part of that people in the time of Iſaiah, making them a ſacrifice to his juſtice, (ch. ix. 6.—29.).

"He then proceeds to ſhow, that God had reaſon to reject moſt of the Jews then living, becauſe they would not believe in the Meſſiah, though the goſpel had been preached to them plainly enough, (ch. ix. 30. x. to the end). However, that God had not rejected all the people, but was ſtill fulfilling his promiſe upon many thouſand natural deſcendants of Abraham, who believed in the Meſſiah, and would in a future period fulfil them upon more; for that all Iſrael would be converted, (ch. xi. 1—32.). And he concluded with admiring the wiſe counſels of God, (ver. 33. to the end).

"XIII. From the doctrine hitherto laid down, and particularly from this, that God has in mercy accepted the Gentiles; he argues, that the Romans ſhould conſecrate and offer themſelves up wholly to God. This leads him to mention in particular ſome Chriſtian duties, (ch. xii.), viz.

"XIV. He exhorts them to be ſubject to magiſtrates (ch. xiii. 1—7.); the Jews at that time being given to ſedition.

"XV. To love one another heartily (ver. 2—10.). And,

"XVI. To abſtain from thoſe vices which were conſidered as things indifferent among the Gentiles, (ver. 11. to the end).

"XVII. He exhorts the Jews and Gentiles in the Chriſtian church to brotherly unity, (ch. xiv. 2. xv. 13.).

"XVIII. He concludes his Epiſtle with an excuſe for having ventured to admoniſh the Romans, whom he had not converted; with an account of the journey to Jeruſalem; and with ſome ſalutations to thoſe perſons whom he meant to recommend to the church at Rome." See *Michaelis's Lectures on the New Teſtament.*

181 First Epiſtle to the Corinthians.

Corinth was a wealthy and luxurious city, built upon the iſthmus which joins the Morea to the northern parts of Greece. In this city Paul had ſpent two years founding a Chriſtian church, which conſiſted of a mixture of Jews and Gentiles, but the greater part Gentiles.

182 Its date.

About three years after the apoſtles had left Corinth, he wrote this Epiſtle from Epheſus in the year 56 or 57, and in the beginning of Nero's reign. That it was written from Epheſus, appears from the ſalutation with which the Epiſtle cloſes, (chap. xvi. 19.). "The churches of Aſia ſalute you. Aquila and Priſcilla ſalute you much in the Lord." From theſe words it is evident, in the 1ſt place, that the Epiſtle was written in Aſia. 2dly, It appears from Acts xviii. 18, 19. that Aquila and Priſcilla accompanied Paul from Corinth to Epheſus, where they ſeem to have continued till Paul's departure.

St Paul had certainly kept up a conſtant intercourſe with the churches which he had founded; for he was evidently acquainted with all their revolutions. They ſeem to have applied to him for advice in thoſe difficult caſes which their own underſtanding could not ſolve; and he was ready on all occaſions to correct their miſtakes. Scripture.

183 General deſign of it.

This Epiſtle conſiſts of two parts. 1. A reproof for thoſe vices to which they were moſt propenſe; 2. An anſwer to ſome queries which they had propoſed to him.

The Corinthians, like the other Greeks, had been accuſtomed to ſee their philoſophers divide themſelves into different ſects; and as they brought along with them into the Chriſtian church their former opinions and cuſtoms, they wiſhed, as before, to arrange themſelves under different leaders. In this Epiſtle Paul condemns theſe diviſions as inconſiſtent with the ſpirit of Chriſtianity, which inculcates benevolence and unanimity, and as oppoſite to the conduct of Chriſtian teachers, who did not, like the philoſophers, aſpire after the praiſe of eloquence and wiſdom. They laid no claim to theſe nor to any honour that cometh from men. The apoſtle declares, that the Chriſtian truths were revealed from heaven; that they were taught with great plainneſs and ſimplicity, and proved by the evidence of miracles, (chap. i. 1.). He diſſuades them from their diviſions and animoſities, by reminding them of the great trial which every man's work muſt undergo; of the guilt they incurred by polluting the temple or church of God; of the vanity of human wiſdom; and of glorying in men. He admoniſhes them to eſteem the teachers of the goſpel only as the ſervants of Chriſt; and to remember that every ſuperior advantage which they enjoyed was to be aſcribed to the goodneſs of God, (chap. iii. 4.).

184 The apoſtle reproves the Corinthians for their vices;

2. In the fifth chapter the apoſtle conſiders the caſe of a notorious offender, who had married his ſtepmother; and tells them, that he ought to be excommunicated. He alſo exhorts the Chriſtians not to aſſociate with any perſon who led ſuch an openly profane life.

3. He cenſures the Corinthians for their litigious diſpoſition, which cauſed them to proſecute their Chriſtian brethren before the Heathen courts. He expreſſes much warmth and ſurpriſe that they did not refer their differences to their brethren; and concludes his exhortations on this ſubject, by aſſuring them that they ought rather to allow themſelves to be defrauded than to ſeek redreſs from Heathens (chap. v. 1—9.).

4. He inveighs againſt thoſe vices to which the Corinthians had been addicted before their converſion, and eſpecially againſt fornication, the criminality of which they did not fully perceive, as this vice was generally overlooked in the ſyſtems of the philoſophers, (chap. vi. 10. to the end).

185 And anſwers certain queſtions which they had propoſed to him.

Having thus pointed out the public irregularities with which they were chargeable, he next replies to certain queſtions which the Corinthians had propoſed to him by letter. He, 1. Determines ſome queſtions relating to the marriage ſtate; as, 1ſt, Whether it was good to marry under the exiſting circumſtances of the church? And, 2d, Whether they ſhould withdraw from their partners if they continued unbelievers? (chap. vii.).

2. He inſtructs them how to act with reſpect to idol offerings. It could not be unlawful in itſelf to eat the food which had been offered to idols; for the conſecration of fleſh or wine to an idol did not make it the property of the idol, an idol being nothing, and therefore incapable

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incapable of property. But ſome Corinthians thought it lawful to go to a feaſt in the idol temples, which at the ſame time were places of reſort for lewdneſs, and to eat the ſacrifices whilſt praiſes were ſung to the idol. This was publicly joining in the idolatry. He even adviſes to abſtain from ſuch participation as was lawful, rather than give offence to a weak brother; which he enforces by his own example, who had abſtained from many lawful things, rather than prove a ſcandal to the goſpel, (chap. viii. ix. x.).

3. He anſwers a third query concerning the manner in which women ſhould deliver any thing in public, when called to it by a divine impulſe. And here he cenſures the unuſual dreſs of both ſexes in propheſying, which expoſed them to the contempt of the Greeks, among whom the men uſually went uncovered and the women veiled.

Being thus led to the conſideration of the abuſes that prevailed in their public worſhip, he goes on to cenſure the irregularities which were committed at their love-feaſts, or, as we term them, the *Lord's Supper*. It was a common practice with the Greeks at their ſocial ſuppers for every man to bring his own proviſions along with him, not, however, to ſhare them with the company, but to feaſt on them in a ſolitary manner. Thus the rich ate and drank to exceſs, whilſt the poor were totally neglected. The Corinthians introduced the ſame practice in the celebration of the Lord's Supper, thus confounding it with their ordinary meals, and without ever examining into the end of the inſtitution. It was this groſs abuſe that Paul reproves in the 11th chapter. He alſo cenſures their conduct in the exerciſe of the extraordinary gifts of the Holy Ghoſt; he ſhows them they all proceeded from the ſame ſpirit, and were intended for the inſtruction of Chriſtian ſocieties; that all Chriſtians ought to be united in mutual love; and that tenderneſs ought to be ſhown to the moſt inconſiderable member, as every one is ſubſervient to the good of the whole (chap. xii.). In the 13th chapter he gives a beautiful deſcription of benevolence, which has been much and juſtly admired. He repreſents it as ſuperior to the ſupernatural gifts of the ſpirit, to the moſt exalted genius, to univerſal knowledge, and even to faith. In the 14th chapter he cautions the Corinthians againſt oſtentation in the exerciſe of the gift of languages, and gives them proper advices.

4. He aſſerts the reſurrection of the dead, in oppoſition to ſome of the Corinthians who denied it, founding it on the reſurrection of Jeſus Chriſt, which he conſiders as one of the moſt eſſential doctrines of Chriſtianity. He then anſwers ſome objections to the reſurrection, drawn from our not being capable of underſtanding how it will be accompliſhed, (chap. xv.). He then concludes with ſome directions to the Corinthian church concerning the manner of collecting alms; promiſes them a viſit, and ſalutes ſome of the members.

186 The ſecond Epiſtle to the Corinthians.

The ſecond Epiſtle to the Corinthians was written from Macedonia in the year 57, about a year after the former. See 2 Cor. ix. 1—5. viii. and xiii. 1.

187 State of the Corinthian church.

St Paul's firſt Epiſtle had wrought different effects among the Corinthians: many of them examined their conduct; they excommunicated the inceſtuous man; requeſted St Paul's return with tears; and vindicated him and his office againſt the falſe teacher and his adherents. Others of them ſtill adhered to that adverſary of St Paul, expreſsly denied his apoſtolic office, and even furniſhed themſelves with pretended arguments from that Epiſtle. He had formerly promiſed to take a journey from Epheſus to Corinth, thence to viſit the Macedonians, and return from them to Corinth (2 Cor. i. 15, 16.). But the unhappy ſtate of the Corinthian church made him alter his intention (verſe 23.), ſince he found he muſt have treated them with ſevcrity. Hence his adverſaries partly argued, 1. That St Paul was irreſolute and unſteady, and therefore could not be a prophet: 2. The improbability of his ever coming to Corinth again, ſince he was afraid of them. Such was the ſtate of the Corinthian church when St Paul, after his departure from Epheſus, having viſited Macedonia, (Acts xx. 1.), received an account of the above particulars from Titus (2 Cor. vii. 5, 6.), and therefore wrote them his ſecond Epiſtle about the end of the ſame year, or the beginning of 58.

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188 View of the contents of this Epiſtle.

But to give a more diſtinct view of the contents of this Epiſtle:

1. The apoſtle, after a general ſalutation, expreſſes his grateful ſenſe of the divine goodneſs; profeſſing his confidence in God, ſupported by a ſenſe of his own integrity; makes an apology for not having viſited the Corinthians as he had intended, and vindicates himſelf from the charge of fickleneſs, (chap. i.).

2. He forgives the inceſtuous man, whoſe conduct had made ſo deep an impreſſion on the apoſtle's mind, that one reaſon why he had deferred his journey to Corinth was, that he might not meet them in grief, nor till he had received advice of the effect of his apoſtolical admonitions. He mentions his anxiety to meet Titus at Troas, in order to hear of their welfare; expreſſes his thankfulneſs to God for the ſucceſs attending his miniſtry, and ſpeaks of the Corinthians as his credentials, written by the finger of God, (chap. ii. iii. 1.—6.).

3. He treats of the office committed to him of preaching the redemption; and highly prefers it to preaching the law: to which probably his adverſaries had made great pretences. They had ridiculed his ſufferings; which he ſhows to be no diſgrace to the goſpel or its miniſters; and here he gives a ſhort abſtract of the doctrine he preaches, (chap. iii. 6. v. to the end).

He expatiates with great copiouſneſs on the temper with which, in the midſt of afflictions and perſecutions, he and his brethren executed their important embaſſy; and with great affection and tenderneſs he exhorts them to avoid the pollution of idolatry, (chap. vi.). He endeavours to win their confidence, by telling them how much he rejoiced in their amendment and welfare, and how ſorry he had been for the diſtreſs which his neceſſary reproofs had occaſioned, (chap. vii.). He then exhorts them to make liberal contributions for the Chriſtians in Judæa. He recommends to them the example of the Macedonians, and reminds them of the benevolence of the Lord Jeſus. He expreſſes his joy for the readineſs of Titus to aſſiſt in making the collection; and makes alſo honourable mention of other Chriſtian brethren, whom he had joined with Titus in the ſame commiſſion, chap. viii.). He then, with admirable addreſs, urges a liberal contribution, and recommends them to the divine bleſſing. (chap. ix.).

4. Next he obviates ſome reflections which had been thrown

Scripture. thrown on him for the mildneſs of his conduct, as if it had proceeded from fear. He aſſerts his apoſtolical power and authority, cautioning his opponents againſt urging him to give too ſenſible demonſtrations of it, (chap. x.). He vindicates himſelf againſt the inſinuations of ſome of the Corinthians, particularly for having declined pecuniary ſupport from the church; an action which had been ungenerouſly turned to his diſadvantage. To ſhow his ſuperiority over thoſe deſigning men who had oppoſed his preaching, he enumerates his ſufferings; gives a detail of ſome extraordinary revelations which he had received; and vindicates himſelf from the charge of boaſting, by declaring that he had been forced to it by the deſire of ſupporting his apoſtolical character, (chap. xi. xii.). He cloſes the Epiſtle, by aſſuring them with great tenderneſs how much it would grieve him to demonſtrate his divine commiſſion by ſeverer methods.

189 Epiſtle to the Galatians. The Galatians were deſcended from thoſe Gauls who had formerly invaded Greece, and afterwards ſettled in Lower Aſia. St Paul had preached the goſpel among them in the year 51, ſoon after the council held at Jeruſalem, (Acts xvi. 6.). Aſia ſwarmed at that time with zealots for the law of Moſes, who wanted to impoſe it on the Gentiles, (Acts xv. 1.). Soon after St Paul had left the Galatians, theſe falſe teachers had got among them, and wanted them to be circumciſed, &c. This occaſioned the following Epiſtle, which Michaelis thinks was written in the ſame year, before St Paul left Theſſalonica. Dr Lardner dates it about the end of the year 52, or in the very beginning of 53, before St Paul ſet out to go to Jeruſalem by way of Epheſus.

190 The date

191 and contents of it. The ſubject of this Epiſtle is much the ſame with that of the Epiſtle to the Romans; only this queſtion is more fully conſidered here, "Whether circumciſion, and an obſervance of the Levitical law, be neceſſary to the ſalvation of a Chriſtian convert?" It appears, theſe Judaizing Chriſtians, whoſe indirect views St Paul expoſes (Acts xv. 1. Gal. v. 3, 9.), at firſt only repreſented circumciſion as neceſſary to ſalvation; but afterwards they inſiſted upon the Chriſtians receiving the Jewiſh feſtivals, (Gal. iv. 10.).

As St Paul had founded the churches of Galatia, and inſtructed them in the Chriſtian religion, he does not ſet before them its principal doctrines, as he had done in the Epiſtle to the Romans; but referring them to what he had already taught (chap. i. 8, 9.), he proceeds at once to the ſubject of the Epiſtle.

As it appears from ſeveral paſſages of this Epiſtle, particularly chap. i. 7, 8, 10. and chap. v. 11. that the Judaizing Chriſtians had endeavoured to perſuade the Galatians that Paul himſelf had changed his opinion, and now preached up the Levitical law; he denies that charge, and affirms that the doctrines which he had taught were true, for he had received them from God by immediate revelation. He relates his miraculous converſion; aſſerts his apoſtolical authority, which had been acknowledged by the diſciples of Jeſus; and, as a proof that he had never inculcated a compliance with the Moſaic law, he declares that he had oppoſed Peter at Antioch for yielding to the prejudices of the Jews.

Having now vindicated his character from the ſuſpicion of ſickleneſs, and ſhown that his commiſſion was divine, he argues that the Galatians ought not to ſubmit to the law of Moſes; 1. Becauſe they had received the Holy Ghoſt and the gift of miracles, not by the law, but by the goſpel, (chap. iii. 1—5.). 2. Becauſe the promiſes which God made to Abraham were not reſtricted to his circumciſed deſcendants, but extended to all who are his children by faith, (chap. iii. 6—18.). In anſwer to the objection, *To what then ſerveth the law?* he replies, That it was given becauſe of tranſgreſſion; that is, to preſerve them from idolatry till the Meſſiah himſelf ſhould come. 3. Becauſe all men, whether Jews or Gentiles, are made the children of God by faith, or by receiving the Chriſtian religion, and therefore do not ſtand in need of circumciſion, (chap. iii. 26—29.). From the 1ſt verſe of chap. iv. to the 11th, he argues that the law was temporary, being only fitted for a ſtate of infancy; but that the world, having attained a ſtate of manhood under the Meſſiah, the law was of no farther uſe. In the remaining part of chapter iv. he reminds them of their former affection to him, and aſſures them that he was ſtill their ſincere friend. He exhorts them to ſtand faſt in the liberty with which Chriſt had made them free; for the ſons of Agar, that is, thoſe under the law given at Mount Sinai, are in bondage, and to be caſt out; the inheritance being deſigned for thoſe only who are the free-born ſons of God under the ſpiritual covenant of the goſpel.

Scripture. 192 Arguments by which the apoſtle proves that the law of Moſes was not obligatory on the Galatians. *Locke on the Epiſtles.*

193 How he vindicates his own character from falſe aſperſions. The apoſtle next confutes the falſe report which had been ſpread abroad among the Galatians, that Paul himſelf preached up circumciſion. He had already indirectly refuted this calumny by the particular account which he gave of his life; but he now directly and openly contradicts it in the following manner:

1. By aſſuring them, that all who thought circumciſion neceſſary to ſalvation could receive no benefit from the Chriſtian religion, (chap. v. 2—4.).

2. By declaring, that he expected juſtification only by faith, (verſe 5, 6.).

3. By teſtifying, that they had once received the truth, and had never been taught ſuch falſe doctrines by him, (verſe 7, 8.).

4. By inſinuating that they ſhould paſs ſome cenſure on thoſe who miſled them (ver. 9, 10.), by declaring that he was perſecuted for oppoſing the circumciſion of the Chriſtians, (ver. 11.).

5. By expreſſing a wiſh that thoſe perſons ſhould be cut off who troubled them with his doctrine.

This Epiſtle affords a fine inſtance of Paul's ſkill in managing an argument. The chief objection which the advocates for the Moſaic law had urged againſt him was, that he himſelf preached circumciſion. In the beginning of the Epiſtle he overturns this ſlander by a ſtatement of facts, without taking any expreſs notice of it; but at the end fully refutes it, that it might leave a ſtrong and laſting impreſſion on their minds.

He next cautions them againſt an idea which his arguments for Chriſtian liberty might excite, that it conſiſted in licentiouſneſs. He ſhows them it does not conſiſt in gratifying vicious deſires; for none are under ſtronger obligations to moral duties than the Chriſtian. He recommends gentleneſs and meekneſs to the weak (chap. vi. 1—5.), and exhorts them to be liberal to their teachers, and to all men (ver. 6—10.). He concludes

Scripture. concludes with expoſing the falſe pretences of the Judaizing teachers, and aſſerting the integrity of his own conduct.

194 Epiſtle to the Epheſians. Epheſus was the chief city of all Aſia on this ſide Mount Taurus. St Paul had paſſed through it in the year 54, but without making any ſtay, (Acts xviii. 19—21.). The following year he returned to Epheſus again, and ſtaid there three years, (chap. xix.). During his abode there he completed a very flouriſhing church of Chriſtians, the firſt foundations of which had been laid by ſome inferior teachers. As Epheſus was frequented by perſons of diſtinction from all parts of Aſia Minor, St Paul took the opportunity of preaching in the ancient countries (ver. 10.); and the other churches of Aſia were conſidered as the daughters of the church of Epheſus; ſo that an Epiſtle to the Epheſians was, in effect, an epiſtle to the other churches of Aſia at the ſame time.

195 The date Dr Lardner ſhows it to be highly probable that this epiſtle was written in the year 61, ſoon after Paul's arrival at Rome.

196 and deſign of it. As Paul was in a peculiar manner the apoſtle of the Gentiles, and was now a priſoner at Rome in conſequence of having provoked the Jews, by aſſerting that an obſervance of the Moſaic law was not neceſſary to obtain the favour of God, he was afraid leaſt an advantage ſhould be taken of his confinement to unſettle the minds of thoſe whom he had converted. Hearing that the Epheſians ſtood firm in the faith of Chriſt, without ſubmitting to the law of Moſes, he writes this Epiſtle to give them more exalted views of the love of God, and of the excellence and dignity of Chriſt. This epiſtle is not compoſed in an argumentative or didactic ſtyle: The firſt three chapters conſiſt almoſt entirely of thankſgivings and prayers, or glowing deſcriptions of the bleſſings of the Chriſtian religion. This circumſtance renders them a little obſcure; but by the aſſiſtance of the two following epiſtles, which were written on the ſame occaſion, and with the ſame deſign, the meaning of the apoſtle may be eaſily diſcovered. The laſt three chapters contain practical exhortations. He firſt inculcates unity, love, and concord, from the conſideration that all Chriſtians are members of the ſame body, of which Chriſt is the head. He then adviſes them to forſake the vices to which they had been addicted while they remained heathens. He recommends juſtice and charity; ſtrenuouſly condemns lewdneſs, obſcenity, and intemperance, vices which ſeem to have been too common among the Epheſians. In the 6th chapter he points out the duties which ariſe from the relations of huſbands and wives, parents and children, maſters and ſervants; and concludes with ſtrong exhortations to fortitude, which he deſcribes in an allegorical manner.

197 Epiſtle to the Philippians. The church at Philippi had been founded by Paul, Silas, and Timothy (Acts xvi.), in the year 51, and had continued to ſhow a ſtrong and manly attachment to the Chriſtian religion, and a tender affection for the apoſtle. Hearing of his impriſonment at Rome, they ſent Epaphroditus, one of their paſtors, to ſupply him with money. It appears from this epiſtle that he was in great want of neceſſaries before this contribution arrived; for as he had not converted the Romans, he did not conſider himſelf as intitled to receive ſupplies from them. Being a priſoner, he could not work as formerly; and it was a maxim of his never to accept any pecuniary aſſiſtance from thoſe churches where a faction had been raiſed againſt him. From the Philippians he was not averſe to receive a preſent in the time of want, becauſe he conſidered it as a mark of their affection, and becauſe he was aſſured that they had conducted themſelves as ſincere Chriſtians. Scripture.

198 The date It appears from the apoſtle's own words, that this letter was written while he was a priſoner at Rome, (chap. i. 7, 13. iv. 22.); and from the expectation which he diſcovers (chap. ii. 24.) of being ſoon releaſed and reſtored to them, compared with Philemon v. 22. and Heb. xiii. 13. where he expreſſes a like expectation in ſtronger terms, it is probable that this epiſtle was written towards the end of his firſt impriſonment in the year 62.

199 and deſign of it. The apoſtle's deſign in this epiſtle, which is quite of the practical kind, ſeems to be, "to comfort the Philippians under the concern they had expreſſed at the news of his impriſonment; to check a party-ſpirit that appears to have broken out among them, and to promote, on the contrary, an entire union and harmony of affection; to guard them againſt being ſeduced from the purity of the Chriſtian faith by Judaizing teachers; to ſupport them under the trials with which they ſtruggled; and, above all, to inſpire them with a concern to adorn their profeſſion by the moſt eminent attainments in the divine life." After ſome particular admonitions in the beginning of the 4th chapter, he proceeds in the 8th verſe to recommend virtue in the moſt extenſive ſenſe, mentioning all the different foundations in which it had been placed by the Grecian philoſophers. Towards the cloſe of the epiſtle, he makes his acknowledgements to the Philippians for the ſeaſonable and liberal ſupply which they had ſent him, as it was ſo convincing a proof of their affection for him, and their concern for the ſupport of the goſpel, which he preferred far above any private ſecular intereſt of his own; expreſsly diſclaiming all ſelfiſh, mercenary views, and aſſuring them with a noble ſimplicity, that he was able upon all occaſions to accommodate his temper to his circumſtances; and had learned, under the teachings of Divine grace, in whatever ſtation Providence might ſee fit to place him, therewith to be content. After which, the apoſtle, having encouraged them to expect a rich ſupply of all their wants from their God and Father, to whom he devoutly aſcribes the honour of all, concludes with ſalutations from himſelf and his friends at Rome to the whole church, and a ſolemn benediction, (verſe 10. to the end); and declares, that he rejoiced in their liberality chiefly on their own account.

200 Epiſtle to the Coloſſians.—Date and deſign of it. The epiſtle to the Coloſſians was written while Paul was in priſon (chap. iv. 3.), and was therefore probably compoſed in the year 62. The intention of the apoſtle, as far as can be gathered from the epiſtle itſelf, was to ſecure the Coloſſians from the influence of ſome doctrines that were ſubverſive of Chriſtianity, and to excite them to a temper and behaviour worthy of their ſacred character. A new ſect had ariſen, which had blended the oriental philoſophy with the ſuperſtitious opinions of the Jews.

201 To guard the Coloſſians againſt the dangerous doctrines of the Jews. They held, 1. That God was ſurrounded by demons or angels, who were mediators with God, and therefore to be worſhipped. 2. That the ſoul is defiled by the body; that all bodily enjoyments hurt the ſoul, which they believed to be immortal, though they ſeem to have denied

Scripture. denied the reſurrection of the body, as it would only render the ſoul ſinful by being reunited to it. 3. That there was a great myſtery in numbers, particularly in the number ſeven; they therefore attributed a natural holineſs to the ſeventh or Sabbath day, which they obſerved more ſtrictly than the other Jews. They ſpent their time moſtly in contemplation; abſtained from marriage, and every gratification of the ſenſes; uſed waſhings, and thought it ſinful to touch certain things; regarded wine as poiſon, &c.

Percy's Key to the New Teſtament.

202 The arguments which the apoſtle employs.

The arguments againſt theſe doctrines are managed with great ſkill and addreſs. He begins with expreſſing great joy for the favourable character which he had heard of them, and aſſures them that he daily prayed for their farther improvement. Then he makes a ſhort digreſſion, in order to deſcribe the dignity of Jeſus Chriſt; declares that he had created all things, whether thrones or dominions, principalities and powers; that he alone was the head of the church, and had reconciled men to the Father. The inference from this deſcription is evident, that Jeſus was ſuperior to angels; that they were created beings, and ought not to be worſhipped. Thus he indirectly confutes one doctrine before he formally oppoſes it. Paul now returns from his digreſſion in the 21ſt verſe to the ſentiments with which he had introduced it in the 13th and 14th verſes, and again expreſſes his joy that the Philippians remained attached to the goſpel, which was to be preached to the Gentiles, without the reſtraints of the ceremonial law. Here again he ſtates a general doctrine, which was inconſiſtent with the opinions of thoſe who were zealous for the law of Moſes; but he leaves the Coloſſians to draw the inference, (chap. i.).

Having again aſſured them of his tender concern for their welfare, for their advancement in virtue, and that they might acknowledge the myſtery of God, that is, that the goſpel was to ſuperſede the law of Moſes, he proceeds directly to caution them againſt the philoſophy of the new teachers, and their ſuperſtitious adherence to the law; ſhows the ſuperiority of Chriſt to the angels, and warns Chriſtians againſt worſhipping them. He cenſures the obſervation of Sabbaths, and rebukes thoſe who required abſtinence from certain kinds of food, and cautions them againſt perſons who aſſume a great appearance of wiſdom and virtue, (chap. ii.).

203 Exhortations.

In the 3d chapter he exhorts them, that, inſtead of being occupied about external ceremonies, they ought to cultivate pure morality. He particularly guards them againſt impurity, to which they had before their converſion been much addicted. He admoniſhes them againſt indulging the iraſcible paſſions, and againſt committing falſehood. He exhorts them to cultivate the benevolent affections, and humility, and patience. He recommends alſo the relative duties between huſbands and wives, parents and children, maſters and ſervants. He enjoins the duties of prayer and thankſgiving (chap. iv. 2.), and requeſts them to remember him in their petitions. He enjoins affability and mild behaviour to the unconverted heathens (verſe 6th); and concludes the epiſtle with matters which are all of a private nature, except the directions for reading this epiſtle in the church of Laodicea, as well as in the church of Coloſſe.

204 First Epiſtle to the Theſſalonians.

This epiſtle is addreſſed to the inhabitants of Theſſalonica, the capital of Macedonia, a large and populous city. It appears from the Acts, chapter xvii. 1. that the Chriſtian religion was introduced into this city by Paul and Silas, ſoon after they had left Philippi. At firſt they made many converts; but at length the Jews, ever jealous of the admiſſion of the Gentiles to the ſame privileges with themſelves, ſtirred up the rabble, which aſſaulted the houſe where the apoſtle and his friends lodged; ſo that Paul and Silas were obliged to flee to Berea, where their ſucceſs was ſoon interrupted by the ſame reſtleſs and implacable enemies. The apoſtle then withdrew to Athens; and Timothy, at his deſire, returned to Theſſalonica (1 Theſſ. iii. 2.), to ſee what were the ſentiments and behaviour of the inhabitants after the perſecution of the Jews. From Athens Paul went to Corinth, where he ſtayed a year and ſix months; during which, Timothy returned with the joyful tidings, that the Theſſalonians remained ſtedfaſt to the faith, and firmly attached to the apoſtle, notwithſtanding his flight. Upon this he ſent them this epiſtle, A. D. 52, in the 12th year of Claudius.

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205 The date

This is generally reckoned the firſt epiſtle which Paul wrote; and we find he was anxious that it ſhould be read to all the Chriſtians. In chap. v. 27. he uſes theſe words; "I adjure you by the Lord, that this epiſtle be read unto all the holy brethren." This direction is very properly inſerted in his firſt epiſtle.

206 and deſign of it.

The intention of Paul in writing this epiſtle was evidently to encourage the Theſſalonians to adhere to the Chriſtian religion. This church being ſtill in its infancy, and oppreſſed by the powerful Jews, required to be eſtabliſhed in the faith. St Paul, therefore, in the three firſt chapters, endeavours to convince the Theſſalonians of the truth and divinity of his goſpel, both by the miraculous gifts of the Holy Ghoſt which had been imparted, and by his own conduct when among them.

While he appeals, in the firſt chapter, to the miraculous gifts of the Holy Spirit, he is very liberal in his commendations. He vindicates himſelf from the charge of timidity, probably to prevent the Theſſalonians from forming an unfavourable opinion of his fortitude, which his flight might have excited. He aſſerts, that he was not influenced by ſelfiſh or diſhonourable motives, but that he was anxious to pleaſe God and not man. He expreſſes a ſtrong affection for them, and how anxious he was to impart the bleſſings of the goſpel. He congratulates himſelf upon his ſucceſs; mentions it to their honour that they received the goſpel as the word of God and not of man, and therefore did not renounce it when perſecution was raiſed by the Jews. He expreſſes a ſtrong deſire to viſit the Theſſalonians; and aſſures them he had been hitherto retained againſt his will.

As a farther proof of his regard, the apoſtle informs them, that when he came to Athens, he was ſo much concerned, leaſt, being diſcouraged by his ſufferings, they ſhould be tempted to caſt off their profeſſion, that he could not forbear ſending Timothy to comfort and ſtrengthen them; and expreſſes, in very ſtrong terms, the ſenſible pleaſure he felt, in the midſt of all his afflictions, from the favourable account he received of their faith and love; to which he adds, that he was continually praying for their farther eſtabliſhment in religion, and for an opportunity of making them another viſit, in

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order to promote their edification, which lay ſo near his heart, (chap. iii. throughout).

Having now ſhown his paternal affection for them, with great addreſs he improves all that influence which his zeal and fidelity in their ſervice muſt naturally have given him to inculcate upon them the precepts of the goſpel. He recommends chaſtity, in oppoſition to the prevailing practice of the heathens; juſtice, in oppoſition to fraud. He praiſes their benevolence, and encourages them to cultivate higher degrees of it. He recommends induſtry and prudent behaviour to their heathen neighbours. In order to comfort them under the loſs of their friends, he aſſures them that thoſe who were fallen aſleep in Jeſus ſhould be raiſed again at the laſt day, and ſhould, together with thoſe who remained alive, be caught up to meet their Lord, and ſhare his triumph, (chap. iv.). He admoniſhes them to prepare for this ſolemn event, that it might not come upon them unawares; and then concludes the epiſtle with various exhortations.

207 Second Epiſtle to the Theſſalonians.

The ſecond epiſtle to the Theſſalonians appears to have been written ſoon after the firſt, and from the ſame place; for Silvanus or Silas, and Timothy, are joined together with the apoſtle in the inſcriptions of this epiſtle, as well as of the former.

208 Contents of it.

The apoſtle begins with commending the faith and charity of the Theſſalonians, of which he had heard a favourable report. He expreſſes great joy on account of the patience with which they ſupported perſecution; and obſerves that their perſecution was a proof of a righteous judgement to come, where their perſecutors would meet with their proper recompenſe, and the righteous be delivered out of all their afflictions. He aſſures them of his conſtant prayers for their farther improvement, in order to attain the felicity that was promiſed, (chap. i.).

From miſunderſtanding a paſſage in his former letter, it appears that the Theſſalonians believed the day of judgement was at hand. To rectify this miſtake, he informs them that the day of the Lord will not come till a great apoſtacy has overſpread the Chriſtian world, the nature of which he deſcribes (G). Symptoms of this myſtery of iniquity had then appeared; but the apoſtle expreſſes his thankfulneſs to God that the Theſſalonians had eſcaped this corruption. He exhorts them to ſtedfaſtneſs, and prays that God would comfort and ſtrengthen them, (chap. ii.).

He requeſts the prayers of the Theſſalonians for him and his two aſſiſtants, at the ſame time expreſſing his confidence that they would pay due regard to the inſtructions which he had given them. He then proceeds to correct ſome irregularities. Many of the Theſſalonians ſeem to have led an idle diſorderly life; theſe he ſeverely reproves, and commands the faithful to ſhun their company if they ſtill remained incorrigible.

209 Firſt Epiſtle to Timothy, when written.

When the firſt Epiſtle to Timothy was written, it is difficult to aſcertain. Lardner dates it in 56; Mill, Whitby, and Macknight, place it in 64: but the arguments on which each party founds their opinion are too long to inſert here.

Scripture.

210 Intention and contents of it.

Timothy was the intimate friend and companion of Paul, and is always mentioned by that apoſtle with much affection and eſteem. Having appointed him to ſuperintend the church of Epheſus during a journey which he made to Macedonia, he wrote this letter, in order to direct him how to diſcharge the important truſt which was committed to him. This was the more neceſſary, as Timothy was young and inexperienced, (1 Tim. iv. 12.). In the beginning of the epiſtle he reminds him of the charge with which he had intruſted him, to wit, to preſerve the purity of the goſpel againſt the pernicious doctrines of the Judaizing teachers, whoſe opinions led to frivolous controverſies, and not to a good life. He ſhows the uſe of the law of Moſes, of which theſe teachers were ignorant. This account of the law, he aſſures Timothy, was agreeable to the repreſentation of it in the goſpel, with the preaching of which he was intruſted. He then makes a digreſſion, in the fulneſs of his heart, to expreſs the ſenſe which he felt of the goodneſs of God towards him.

In the ſecond chapter, the apoſtle preſcribes the manner in which the worſhip of God was to be performed in the church of Epheſus; and in the third explains the qualifications of the perſons whom he was to ordain as biſhops and deacons. In the fourth chapter he foretels the great corruptions of the church which were to prevail in future times, and inſtructs him how to ſupport the ſacred character. In the fifth chapter he teaches Timothy how to admoniſh the old and young of both ſexes; mentions the age and character of ſuch widows as were to be employed by the ſociety in ſome peculiar office; and ſubjoins ſome things concerning the reſpect due to elders. In the ſixth chapter he deſcribes the duties which Timothy was to inculcate on ſlaves; condemns trifling controverſies and pernicious diſputes; cenſures the exceſſive love of money, and charges the rich to be rich in good works.

211 Second Epiſtle to Timothy.

That the ſecond Epiſtle to Timothy was written from Rome is univerſally agreed; but whether it was during his firſt or ſecond impriſonment has been much diſputed. That Timothy was at Epheſus or in Aſia Minor when this Epiſtle was ſent to him, appears from the frequent mention in it of perſons reſiding at Epheſus. The apoſtle ſeems to have intended to prepare Timothy for thoſe ſufferings which he foreſaw he would be expoſed to. He exorts him to conſtancy and perſeverance, and to perform with a good conſcience the duties of the ſacred function.

212 Deſign and contents of it.

The falſe teachers, who had before thrown this church into confuſion, grew every day worſe: inſomuch that not only Hymenæus, but Philetus, another Epheſian heretic, now denied the reſurrection of the dead. They were led into this error by a diſpute about words. At firſt they only annexed various improper ſignifications to the word *reſurrection*, but at laſt they denied it altogether (H); pretending that the reſurrection of the dead was only a reſurrection from the death of ſin, and ſo

(G) For an explanation of this prophecy, Dr Hurd's Sermons may be conſulted. He applies it to the papal power, to which it correſponds with aſtoniſhing exactneſs.

(H) This is by no means uncommon among men; to begin to diſpute about the ſignification of words, and to

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ſo was already paſt. This error was probably derived from the eaſtern philoſophy, which placed the origin of ſin in the body (chapter ii.). He then forewarns him of the fatal apoſtacy and declenſion that was beginning to appear in the church; and at the ſame time animates him, from his own example and the great motives of Chriſtianity, to the moſt vigorous and reſolute diſcharge of every part of the miniſterial office.

213 Epiſtle to Titus.

This Epiſtle is addreſſed to Titus, whom Paul had appointed to preſide over the church of Crete. It is difficult to determine either its date or the place from which it was ſent. The apoſtle begins with reminding

214 Deſign and contents of it.

Titus of the reaſons for which he had left him at Crete; and directs him on what principles he was to act in ordaining Chriſtian paſtors: the qualifications of whom he particularly deſcribes. To ſhow him how cautious he ought to be in ſelecting men for the ſacred office, he reminds him of the arts of the Judaizing teachers, and the bad character of the Cretans (chapter i.).

He adviſes him to accommodate his exhortations to the reſpective ages, ſexes, and circumſtances, of thoſe whom it was his duty to inſtruct; and to give the greater weight to his inſtructions, he admoniſhes him to be an example of what he taught (chap. ii.). He exhorts him alſo to teach obedience to the civil magiſtrate, becauſe the Judaizing Chriſtians affirmed that no obedience was due from the worſhippers of the true God to magiſtrates who were idolaters. He cautions againſt cenſorioufneſs and contention, and recommends meekneſs; for even the beſt Chriſtians had formerly been wicked, and all the bleſſings which they enjoyed they derived from the goodneſs of God. He then enjoins Titus ſtrenuouſly to inculcate good works, and to avoid uſeleſs controverſies; and concludes with directing him how to proceed with thoſe heretics who attempted to ſow diſſenſion in the church.

215 Epiſtle to Philemon. —Date and deſign of it.

The epiſtle to Philemon was written from Rome at the ſame time with the Epiſtles to the Coloſſians and Philippians, about A. D. 62 or 63. The occaſion of the letter was this: Oneſimus, Philemon's ſlave, had robbed his maſter and fled to Rome; where, happily for him, he met with the apoſtle, who was at that time a priſoner at large, and by his inſtructions and admonitions was converted to Chriſtianity; and reclaimed to a

Doddridge's Family Expoſitor.

ſenſe of his duty. St Paul ſeems to have kept him for ſome conſiderable time under his eye, that he might be ſatisfied of the reality of the change; and, when he had made a ſufficient trial of him, and found that his behaviour was entirely agreeable to his profeſſion, he would not detain him any longer for his own private convenience, though in a ſituation that rendered ſuch an aſſiſtant peculiarly deſirable (compare ver. 13, 14.), but ſent him back to his maſter; and, as a mark of his eſteem, entruſted him, together with Tychicus, with the charge of delivering his Epiſtle to the church at Coloſſe, and giving them a particular account of the ſtate of things at Rome, recommending him to them, at the ſame time, as a faithful and beloved brother (Col. iv. 9.). And as Philemon might well be ſuppoſed to be ſtrongly prejudiced againſt one who had left his ſervice in ſo infamous a manner, he ſends him this letter, in which he employs all his influence to remove his ſuſpicions, and reconcile him to the thoughts of taking Oneſimus into his family again. And whereas St Paul might have exerted that authority which his character as an apoſtle, and the relation in which he ſtood to Philemon as a ſpiritual father, would naturally give him, he chooſes to entreat him as a friend; and with the ſofteſt and moſt inſinuating addreſs urges his ſuit, conjuring him by all the ties of Chriſtian friendſhip that he would not deny him his requeſt: and the more effectually to prevail upon him, he repreſents his own peace and happineſs as deeply intereſted in the event; and ſpeaks of Oneſimus in ſuch terms as were beſt adapted to ſoften his prejudices, and diſpoſe him to receive one who was ſo dear to himſelf, not merely as a ſervant, but as a fellow Chriſtian and a friend.

Scripture.

216 The ſkill and addreſs which the apoſtle diſcovers in this Epiſtle.

It is impoſſible to read over this admirable Epiſtle, without being touched with the delicacy of ſentiment, and the maſterly addreſs that appear in every part of it. We ſee here, in a moſt ſtriking light, how perfectly conſiſtent true politeneſs is, not only with all the warmth and ſincerity of the friend, but even with the dignity of the Chriſtian and the apoſtle. And if this letter were to be conſidered in no other view than as a mere human compoſition, it muſt be allowed a maſter-piece in its kind. As an illuſtration of this remark, it may not be improper to compare it with an epiſtle of Pliny, that ſeems to have been written upon a ſimilar occaſion, (lib. ix. lit. 21); which, though penned by one that was reckoned to excel in the epiſtolary ſtyle, and though it has undoubtedly many beauties, yet muſt be acknowledged, by every impartial reader, vaſtly inferior to this animated compoſition of the apoſtle.

217 Epiſtle to the Hebrews was compoſed by Paul.

The epiſtle to the Hebrews has been generally aſcribed to Paul; but the truth of this opinion has been ſuſpected by others, for three reaſons: 1. The name of the writer is nowhere mentioned, neither in the beginning nor in any other part of the Epiſtle. 2. The ſtyle is ſaid to be more elegant than Paul's. 3. There are expreſſions in the Epiſtle which have been thought unſuitable to an apoſtle's character. 1. In anſwer to the firſt objection, Clemens Alexandrinus has aſſigned a very good reaſon: "Writing to the Hebrews (ſays he), who had conceived a prejudice againſt him, and were ſuſpicious of him, he wiſely declined ſetting his name at the beginning, leſt he ſhould offend them." 2. Origen and Jerome admired the elegance of the ſtyle, and reckoned it ſuperior to that which Paul has exhibited in his Epiſtles: but as ancient teſtimony had aſſigned it to Paul, they endeavoured to anſwer the objection, by ſuppoſing that the ſentiments were the apoſtle's, but the language and compoſition the work of ſome other perſon. If the Epiſtle, however, be a tranſlation, which we believe it to be, the elegance of the language may belong to the tranſlator. As to the compoſition and arrangement, it cannot be denied that there are many ſpecimens in the writings of this apoſtle not in-

Macknight on the Epiſtles.

to be led gradually to deny the thing ſignified. This appears to have been the cauſe of moſt diſputes, and the general beginning of ſcepticiſm and infidelity.

Scripture.

ferior in these qualities to the Epistle to the Hebrews. 3. It is objected, that in Heb. ii. 3. the writer of this Epistle joins himself with those who had received the gospel from Christ's apostles. Now Paul had it from Christ himself. But Paul often appeals to the testimony of the apostles in support of those truths which he had received from Revelation. We may instance 1 Cor. xv. 5, 6, 7, 8.; 2. Tim. ii. 2.

218 Quoted as his by ancient writers.

This Epistle is not quoted till the end of the second century, and even then does not seem to have been universally received. This silence might be owing to the Hebrews themselves, who supposing this letter had no relation to the Gentiles, might be at pains to diffuse copies of it. The authors, however, on whose testimony we receive it as authentic, are entitled to credit; for they lived so near the age of the apostles, that they were in no danger of being imposed on; and from the numerous list of books which they rejected as spurious, we are assured that they were very careful to guard against imposition. It is often quoted as Paul's by Clemens Alexandrinus, about the year 194. It is received and quoted as Paul's by Origen, about 230; by Dionysius bishop of Alexandria in 247; and by a numerous list of succeeding writers.

219 Written in the Syro-Chaldaic language.

The Epistle to the Hebrews was originally written in Hebrew, or rather Syro-Chaldaic; a fact which we believe on the testimony of Clemens Alexandrinus, Jerome, and Eusebius. To this it has been objected, that as these writers have not referred to any authority, we ought to consider what they say on this subject merely as an opinion. But as they state no reasons for adopting this opinion, but only mention as a fact that Paul wrote to the Hebrews in their native language, we must allow that it is their testimony which they produce, and not their opinion. Eusebius informs us, that some supposed Luke the Evangelist, and others Clemens Romanus, to have been the translator.

According to the opinion of ancient writers, particularly Clemens Alexandrinus, Jerome, and Euthalius, this Epistle was addressed to the Jews in Palestine.—The scope of the Epistle confirms this opinion.

220 Date of it.

Having now given sufficient evidence that this Epistle was written by Paul, the time when it was written may be easily determined: For the salutation from the saints of Italy (chap. iv. 24.), together with the apostle's promise to see the Hebrews (ver. 23.), plainly intimate, that his confinement was then either ended or on the eve of being ended. It must therefore have been written soon after the Epistles to the Colossians, Ephesians, and Philemon, and not long before Paul left Italy, that is, in the year 61 or 62.

Percy's Key to the New Testament.

As the zealous defenders of the Mosaic law would naturally insist on the divine authority of Moses, on the majesty and glory attending its promulgation by the ministry of angels, and the great privileges it afforded those who adhered to it; the apostle shows,

221 Design of it to prove to the Jews the truth of the Christian religion and its superiority to the law of Moses;

I. That in all these several articles Christianity had an infinite superiority to the law.

This topic he pursues from chap. i. to xi. wherein he reminds the believing Hebrews of the extraordinary favour shown them by God, in sending them a revelation by his own son, whose glory was far superior to that of angels (chap. i. throughout); very naturally inferring from hence the danger of despising Christ on account of his humilitation, which, in perfect consistence with his dominion over the world to come, was voluntarily submitted to by him for wise and important reasons; particularly to deliver us from the fear of death, and to encourage the freedom of our access to God (chap. ii. throughout). With the same view he magnifies Christ as superior to Moses, their great legislator; and from the punishment inflicted on those who rebelled against the authority of Moses, infers the danger of contemning the promises of the gospel (chap. iii. 2—13.). And as it was an easy transition to call to mind on this occasion that rest in Canaan to which the authority invested in Moses was intended to lead them; the apostle hence cautions them against unbelief, as what would prevent their entering into a superior state of rest to what the Jews ever enjoyed (chap. iii. 14. iv. 11.). This caution is still farther enforced by awful views of God's omniscience, and a lively representation of the high-priesthood of Christ (chap. iv. to the end; and chap. v. throughout). In the next place, he intimates the very hopeless situation of those who apostatise from Christianity (chap. vi. 1—9.); and then, for the comfort and confirmation of sincere believers, displays to them the goodness of God, and his faithful adherence to his holy engagements; the performance of which is sealed by the entrance of Christ into heaven as our forerunner (chap. vi. 9. to the end). Still farther to illustrate the character of our Lord, he enters into a parallel between him and Melchizedec as to their title and descent; and, from instances wherein the priesthood of Melchizedec excelled the Levitical, infers, that the glory of the priesthood of Christ surpassed that under the law (chap. vii. 1—17). From these premises the apostle argues, that the Aaronical priesthood was not only excelled, but consummated by that of Christ, to which it was only introductory and subservient; and of course, that the obligation of the law was henceforth dissolved (chap. vii. 18. to the end). Then recapitulating what he had already demonstrated concerning the superior dignity of Christ's priesthood, he thence illustrates the distinguished excellence of the new covenant, as not only foretold by Jeremiah, but evidently enriched with much better promises than the old (ch. viii. throughout): Explaining farther the doctrine of the priesthood and intercession of Christ, by comparing it with what the Jewish high-priests did on the great day of atonement (chap. ix. 1—14). Afterwards he enlarges on the necessity of shedding Christ's blood, and the sufficiency of the atonement made by it (chap. ix. 15. to the end); and proves that the legal ceremonies could not by any means purify the conscience: whence he infers the insufficiency of the Mosaic law, and the necessity of looking beyond it (chap. x. 1—15.). He then urges the Hebrews to improve the privileges which such an high-priest and covenant conferred on them, to the purposes of approaching God with confidence, to a constant attendance on his worship, and most benevolent regards to each other (chap. x. 15—25.).

The apostle having thus obviated the insinuations and objections of the Jews, for the satisfaction and establishment of the believing Hebrews, proceeds,

222 and to animate them to bear persecution with fortitude.

II. To prepare and fortify their minds against the storm of persecution which in part had already befallen them, which was likely to continue and be often renewed, he reminds them of those extremities they had endured, and of the fatal effects which would attend their

apostacy

Scripture. apoſtacy (chap. x. 26. to the end); calling to their remembrance the eminent examples of faith and fortitude exhibited by holy men, and recorded in the Old Teſtament (chap. xi. 1—29.). He concludes his diſcourſe with glancing at many other illuſtrious worthies; and, beſides thoſe recorded in Scripture, refers to the caſe of ſeveral who ſuffered under the perſecution of Antiochus Epiphanes (2 Maccab. chap. viii. &c. chap. xi. 30. xii. 2.).

Having thus finiſhed the argumentative part of the Epiſtle, the apoſtle proceeds to a general application; in which he exhorts the Hebrew Chriſtians to patience, peace, and holineſs (chap. xii. 3—14.); cautions them againſt ſecular views and ſenſual gratifications, by laying before them the incomparable excellence of the bleſſings introduced by the goſpel, which even the Jewiſh economy, glorious and magnificent as it was, did by no means equal; exhorts them to brotherly affection, purity, compaſſion, dependence on the divine care, ſtedfaſtneſs in the profeſſion of truth, a life of thankfulneſs to God, and benevolence to man: and concludes the whole with recommending their pious miniſters to their particular regard, intreating their prayers, ſaluting and granting them his uſual benediction.

223 The ſeven Catholic epiſtles. The ſeven following Epiſtles, one of James, two of Peter, three of John, and one of Jude, have been diſtinguiſhed by the appellation of *catholic* or *general* epiſtles, becauſe moſt of them are inſcribed, not to particular churches or perſons, but to the body of Jewiſh or Gentile converts over the world. The authenticity of ſome of theſe has been frequently queſtioned, viz. the Epiſtle of James, the ſecond of Peter, the Epiſtle of Jude, and the ſecond and third of John. The ancient Chriſtians were very cautious in admitting any books into their canon whoſe authenticity they had any reaſon to ſuſpect. They rejected all the writings forged by heretics in the name of the apoſtles, and certainly, therefore, would not receive any without firſt ſubjecting them to a ſevere ſcrutiny. Now, though theſe five epiſtles were not immediately acknowledged as the writings of the apoſtles, this only ſhows that the perſons who doubted had not received complete and inconteſtable evidence of their authenticity. But as they were afterwards univerſally received, we have every reaſon to conclude, that upon a ſtrict examination they were found to be the genuine productions of the apoſtles. The truth is, ſo good an opportunity had the ancient Chriſtians of examining this matter, ſo careful were they to guard againſt impoſition, and ſo well founded was their judgement concerning the books of the New Teſtament, that, as Dr Lardner obſerves, no writing which they pronounced genuine has yet been proved ſpurious, nor have we at this day the leaſt reaſon to believe any book genuine which they rejected.

Macknight on the Epiſtles.

224 Epiſtle of James the Leſs. That the Epiſtle of James was written in the apoſtolical age is proved by the quotations of ancient authors. Clemens Romanus and Ignatius ſeem to have made references to it. Origen quotes it once or twice.—There are ſeveral reaſons why it was not more generally quoted by the firſt Chriſtian writers. Being written to correct the errors and vices which prevailed among the Jews, the Gentiles might think it of leſs importance to them, and therefore take no pains to procure copies of it. As the author was ſometimes denominated James the Juſt, and often called biſhop of Jeruſalem, it might be doubted whether he was one of the apoſtles. But its authenticity does not ſeem to have been ſuſpected on account of the doctrines which it contains. In modern times, indeed, Luther called it a ſtrawy epiſtle (*epiſtola ſtraminea*), and excluded it from the ſacred writings, on account of its apparent oppoſition to the apoſtle Paul concerning juſtification by faith. Scripture.

This Epiſtle could not be written by James the Elder, the ſon of Zebedee, and brother of John, who was beheaded by Herod in the year 44, for it contains paſſages which refer to a later period. It muſt, therefore, have been the compoſition of James the Leſs, the ſon of Alpheus, who was called *the Lord's brother*, becauſe he was the ſon of Mary, the ſiſter of our Lord's mother. 225 As to the date of this Epiſtle, Lardner fixes it in the year 61 or 62. The date

James the Leſs ſtatedly reſided at Jeruſalem, whence he hath been ſtyled by ſome ancient fathers biſhop of that city, though without ſufficient foundation. Now James being one of the apoſtles of the circumciſion, while he confined his perſonal labours to the inhabitants of Judea, it was very natural for him to endeavour by his writings to extend his ſervices to the Jewiſh Chriſtians who were diſperſed abroad in more diſtant regions. For this purpoſe, there are two points which the apoſtle ſeems to have principally aimed at, though he hath not purſued them in an orderly and logical method, but in the free epiſtolary manner, handling them jointly or diſtinctly as occaſions naturally offered. And theſe were, "to correct thoſe errors both in doctrine and practice into which the Jewiſh Chriſtians had fallen, which might otherwiſe have produced fatal conſequences; and then to eſtabliſh the faith and animate the hope of ſincere believers, both under their preſent and their approaching ſufferings." *Doddridge's Family Expoſitor.* 226 and deſign of it.

The opinions which he is moſt anxious to refute are theſe, that God is the author of ſin, (ch. i. 13.); that the belief of the doctrines of the goſpel was ſufficient to procure the favour of God for them, however deficient they were in good works, (ch. ii.). He diſſuades the Jews from aſpiring to the office of teachers in the third chapter, becauſe their prejudices in favour of the law of Moſes might induce them to pervert the doctrines of the goſpel. He therefore guards them againſt the ſins of the tongue, by repreſenting their pernicious effects; and as they thought themſelves wiſe and intelligent, and were ambitious of becoming teachers, he adviſes them to make good their pretenſions, by ſhowing themſelves poſſeſſed of that wiſdom which is from above, (ch. iii.).

The deſtruction of Jeruſalem was now approaching; the Jews were ſplit into factions, and often ſlaughtered one another; the apoſtle, therefore, in the fourth chapter, admoniſhes them to purify themſelves from thoſe vices which produced tumults and bloodſhed. To rouſe them to repentance, he foretels the miſeries that were coming upon them. Laſtly, He checks an irreligious ſpirit that ſeems to have prevailed, and concludes the Epiſtle with ſeveral exhortations.

227 First Epiſtle of Peter. The authenticity of the firſt Epiſtle of Peter has never been denied. It is referred to by Clemens Romanus, by Polycarp, and is quoted by Papias, Irenæus, Clemens Alexandrinus, and Tertullian. It is addreſſed to the ſtrangers ſcattered through Pontus, &c. who are evidently Chriſtians in general, as appears from

chap.

Scripture. chap. ii. 10. "In time paſt they were not a people, but are now the people of God." From Peter's ſending the ſalutation of the church at Babylon to the Chriſtians in Pontus, &c. it is generally believed that he wrote it in Babylon. There was a Babylon in Egypt and another in Aſſyria. It could not be the former, for it was an obſcure place, which ſeems to have had no church for the firſt four centuries. We have no authority to affirm that Peter ever was in Aſſyria. The moſt probable opinion is that of Grotius, Whitby, Lardner, as well as of Euſebius, Jerome, and others, that by Babylon Peter figuratively means Rome. Lardner dates it in 63 or 64, or at the lateſt 65.

228 The date

St Peter's chief deſign is to confirm the doctrine of St Paul, which the falſe teachers pretended he was oppoſing; and to aſſure the proſelytes that they ſtood in the true grace of God, (ch. v. 12.). With this view he calls them elect; and mentions, that they had been declared ſuch by the effuſion of the Holy Ghoſt upon them, (ch. i. 1, 2.). He aſſures them that they were regenerate without circumciſion, merely through the goſpel and reſurrection of Chriſt, (ver. 3, 4, 21—25.); and that their ſufferings were no argument of their being under the diſpleaſure of God, as the Jews imagined, (ver. 6—12.). He recommends it to them to hope for grace to the end, (ver. 13.). He teſtifies, that they were not redeemed by the Paſchal lamb, but through Chriſt, whom God had preordained for this purpoſe before the foundation of the world, (ver. 18—20.).

229 and deſign of it.

230 Second Epiſtle of Peter. The authenticity of it proved

The ſecond Epiſtle of Peter is not mentioned by any ancient writer extant till the fourth century, from which time it has been received by all Chriſtians except the Syrians. Jerome acquaints us, that its authenticity was diſputed, on account of a remarkable difference between the ſtyle of it and the former Epiſtle. But this remarkable difference in ſtyle is confined to the 2d chapter of the 2d Epiſtle. No objection, however, can be drawn from this circumſtance; for the ſubject of that chapter is different from the reſt of Peter's writings, and nothing is ſo well known than that different ſubjects ſuggeſt different ſtyles. Peter, in deſcribing the character of ſome flagitious impoſtors, feels an indignation which he cannot ſuppreſs: it breaks out, therefore, in the bold and animated figures of an oriental writer. Such a diverſity of ſtyle is not uncommon in the beſt writers, eſpecially when warmed with their ſubject.

231 From internal evidence.

This objection being removed, we contend that this Epiſtle was written by Peter, from the inſcription, *Simon Peter, a ſervant and an apoſtle of Jeſus Chriſt.* It appears from chap. i. 16, 17, 18, that the writer was one of the diſciples who ſaw the transfiguration of our Saviour. Since it has never been aſcribed to James or John, it muſt therefore have been Peter. It is evident, from chap. iii. 1. that the author had written an Epiſtle before to the ſame perſons, which is another circumſtance that proves Peter to be the author.

It is acknowledged, however, that all this evidence is merely internal; for we have not been able to find any external evidence upon the ſubject. If, therefore, the credit which we give to any fact is to be in proportion to the degree of evidence with which it is accompanied, we ſhall allow more authority due to the goſpels than to the epiſtles; more to thoſe epiſtles which have been generally acknowledged than to thoſe which have been controverted; and therefore no doctrine of Chriſtianity ought to be founded ſolely upon them. It may alſo be added, that perhaps the beſt way of determining what are the eſſential doctrines of Chriſtianity would be to examine what are the doctrines which occur oftenеſt in the goſpels; for the goſpels are the plaineſt parts of the New Teſtament; and their authenticity is moſt completely proved. They are therefore beſt fitted for common readers. Nor will it be denied, we preſume, that our Saviour taught all the doctrines of the Chriſtian religion himſelf; that he repeated them on different occaſions, and inculcated them with an earneſtneſs proportionable to their importance. The Epiſtles are to be conſidered as a commentary on the eſſential doctrines of the goſpel, adapted to the ſituation and circumſtances of particular churches, and perhaps ſometimes explaining doctrines of inferior importance. 1. The eſſential doctrines are therefore firſt to be ſought for in the goſpels, and to be determined by the number of times they occur. 2. They are to be ſought for, in the next place, in the uncontroverted Epiſtles, in the ſame manner. 3. No eſſential doctrine ought to be founded on a ſingle paſſage, nor on the authority of a controverted Epiſtle. Scripture.

That Peter was old, and near his end, when he wrote this Epiſtle, may be inferred from chap. i. 14. "Knowing that ſhortly I muſt put off this tabernacle, even as our Lord Jeſus has ſhewn me." Lardner thinks it was written ſoon after the former. Others, perhaps with more accuracy, date it in 67.

232 Deſign of it.

The general deſign of this Epiſtle is, to confirm the doctrines and inſtructions delivered in the former; "to excite the Chriſtian converts to adorn, and ſtedfaſtly adhere to their holy religion, as a religion proceeding from God, notwithſtanding the artifices of falſe teachers, whoſe character is at large deſcribed; or the perſecution of their bitter and inveterate enemies."

233 Firſt Epiſtle of John. Its authenticity and ſtyle.

The firſt Epiſtle of John is aſcribed by the unanimous ſuffrage of the ancients to the beloved diſciple of our Lord. It is referred to by Polycarp, is quoted by Papias, by Irenæus, and was received as genuine by Clemens Alexandrinus, by Dionyſius of Alexandria, by Cyprian, by Origen, and Euſebius. There is ſuch a reſemblance between the ſtyle and ſentiments of this Epiſtle and thoſe of the goſpel according to John, as to afford the higheſt degree of internal evidence that they are the compoſition of the ſame author. In the ſtyle of this apoſtle there is a remarkable peculiarity, and eſpecially in this Epiſtle. His ſentences, conſidered ſeparately, are exceeding clear and intelligible; but when we ſearch for their connection, we frequently meet with greater difficulties than we do even in the Epiſtles of St Paul. The principal ſignature and characteriſtic of his manner is an artleſs and amiable ſimplicity, and a ſingular modeſty and candour, in conjunction with a wonderful ſublimity of ſentiment. His conceptions are apparently delivered to us in the order in which they aroſe to his own mind, and are not the product of artificial reaſoning or laboured inveſtigation.

It is impoſſible to fix with any preciſion the *date* of this Epiſtle, nor can we determine to what perſons it was addreſſed.

234 Deſign of it.

The leading deſign of the apoſtle is to ſhow the inſufficiency of faith, and the external profeſſion of religion, ſeparate from morality; to guard the Chriſtians to whom he writes againſt the deluſive arts of the corrupters

Scripture.

rupters of Chriſtianity, whom he calls Antichriſt; and to inculcate univerſal benevolence. His admonitions concerning the neceſſity of good morals, and the inefficacy of external profeſſions, are ſcattered over the Epiſtle, but are moſt frequent in the 1ſt, 2d, and 3d chapters. The enemies or corrupters of Chriſtianity, againſt whom he contends, ſeem to have denied that Jeſus was the Meſſiah, the Son of God (chap. ii. 22. v. 1.), and had actually come into the world in a human form, (chap. iv. 2, 3.). The earneſtneſs and frequency with which this apoſtle recommends the duty of benevolence is remarkable. He makes it the diſtinguiſhing characteriſtic of the diſciples of Jeſus, the only ſure pledge of our love to God, and the only aſſurance of eternal life, (chap. iii. 34, 15.). Benevolence was his favourite theme, which he affectionately preſſed upon others, and conſtantly practiſed himſelf. It was conſpicuous in his conduct to his great Maſter, and in the reciprocal affection which it inſpired in his ſacred breaſt. He continued to recommend it in his laſt words. When his extreme age and infirmities had ſo waſted his ſtrength that he was incapable to exerciſe the duties of his office, the venerable old man, anxious to exert in the ſervice of his Maſter the little ſtrength which ſtill remained, cauſed himſelf to be carried to church, and, in the midſt of the congregation, he repeated theſe words, "Little children, love one another."

235 Second and third Epiſtles of John.

It has been obſerved by Dr Mill that the ſecond and third Epiſtles of John are ſo ſhort, and reſemble the firſt ſo much in ſentiment and ſtyle, that it is not worth while to contend about them. The ſecond Epiſtle conſiſts only of 13 verſes; and of theſe eight may be found in the 1ſt Epiſtle, in which the ſenſe or language is preciſely the ſame.

The ſecond Epiſtle is quoted by Irenæus, and was received by Clemens Alexandrinus. Both were admitted by Athanaſius, by Cyril of Jeruſalem, and by Jerome. The ſecond is addreſſed to a woman of diſtinction whoſe name is by ſome ſuppoſed to be *Cyria* (taking κυρια for a proper name), by others *Electa*. The third is inſcribed to Gaius, or Caius according to the Latin orthography, who, in the opinion of Lardner, was an eminent Chriſtian, that lived in ſome city of Aſia not far from Epheſus, where St John chiefly reſided after his leaving Judea. The time of writing theſe two Epiſtles cannot be determined with any certainty. They are ſo ſhort that an analyſis of them is not neceſſary.

236 Epiſtle of Jude. Its authenticity

The Epiſtle of Jude is cited by no ancient Chriſtian writer extant before Clemens Alexandrinus about the year 194; but this author has tranſcribed eight or ten verſes in his Stromata and Pedagogue. It is quoted once by Tertullian about the year 200; by Origen frequently about 230. It was not however received by many of the ancient Chriſtians, on account of a ſuppoſed quotation from a book of Enoch. But it is not certain that Jude quotes any book. He only ſays that *Enoch propheſied, ſaying, The Lord cometh with ten thouſand of his ſaints.* Theſe might be words of a prophecy preſerved by tradition, and inſerted occaſionally in different writings. Nor is there any evidence that there was ſuch a book as Enoch's prophecies in the time of Jude, though a book of that name was extant in the ſecond and third centuries. As to the date of this Epiſtle nothing beyond conjecture can be produced.

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237 and deſign.

The deſign of it is, by deſcribing the character of the falſe teachers, and the puniſhments to which they were liable, to caution Chriſtians againſt liſtening to their ſuggeſtions, and being thereby perverted from the faith and purity of the goſpel.

238 The Apocalypſe. Its authenticity proved.

The Apocalypſe or Revelation has not always been unanimouſly received as the genuine production of the apoſtle John. Its authenticity is proved, however, by the teſtimony of many reſpectable authors of the firſt centuries. It is referred to by the martyrs of Lyons: it was admitted by Juſtin Martyr as the work of the apoſtle John. It is often quoted by Irenæus, by Theophilus biſhop of Antioch, by Clement of Alexandria, by Tertullian, by Origen, and by Cyprian of Carthage. It was alſo received by heretics, by Novatus and his followers, by the Donatiſts, and by the Arians. For the firſt two centuries no part of the New Teſtament was more univerſally acknowledged, or mentioned with higher reſpect. But a diſpute having ariſen about the millennium, Caius with ſome others, about the year 212, to end the controverſy as ſpeedily and effectually as poſſible, ventured to deny the authority of the book which had given occaſion to it.

239 The date of it.

The book of Revelation, as we learn from Rev. i. 9. was written in the iſle of Patmos. According to the general teſtimony of ancient authors, John was baniſhed into Patmos in the reign of Domitian, and reſtored by his ſucceſſor Nerva. But the book could not be publiſhed till after John's releaſe, when he returned to Epheſus. As Domitian died in 96, and his perſecution did not commence till near the end of his reign, the Revelation might therefore be publiſhed in 96 or 97.

Percy's Key to the New Teſtament.

Here we ſhould conclude; but as the curious reader may deſire to be informed how the predictions revealed in this book of St John have uſually been interpreted and applied, we ſhall conſiſtently with our ſubject ſubjoin *a key to the prophecies contained in the Revelation.* This is extracted from the learned diſſertations of Dr Newton, biſhop of Briſtol (1): to which the reader is referred for a more full illuſtration of the ſeveral parts, as the conciſeneſs of our plan only admits a ſhort analyſis or abridgment of them.

240 Dr Newton's explication of the prophecies which have been already accompliſhed.

Nothing of a prophetical nature occurs in the firſt three chapters, except, 1. What is ſaid concerning the church of Epheſus, that her "candleſtick ſhall be removed out of its place," which is now verified, not only in this, but in all the other Aſiatic churches which exiſted at that time; the light of the goſpel having been taken from them, not only by their hereſies and diviſions from within, but by the arms of the Saracens from without: And, 2. Concerning the church of Smyrna, that ſhe ſhall "have tribulation ten days;" that is, in prophetic language,

(1) Diſſertations on the prophecies which have remarkably been fulfilled, and at this time are fulfilling, in the world, vol. iii. 8vo.

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guage, " ten years;" referring to the perſecution of Diocleſian, which alone of all the general perſecutions laſted ſo long.

The next five chapters relate to the opening of the *Seven Seals;* and by theſe ſeals are intimated ſo many different periods of the prophecy. Six of theſe ſeals are opened in the ſixth and ſeventh chapters.

The *firſt ſeal* or period is memorable for conqueſts. It commences with Veſpaſian, and terminates in Nerva; and during this time Judea was ſubjugated. The *ſecond ſeal* is noted for war and ſlaughter. It commences with Trajan, and continues through his reign, and that of his ſucceſſors. In this period, the Jews were entirely routed and diſperſed; and great was the ſlaughter and devaſtation occaſioned by the contending parties. The *third ſeal* is characteriſed by a rigorous execution of juſtice, and an abundant proviſion of corn, wine, and oil. It commences with Septimius Severus. He and Alexander Severus were juſt and ſevere emperors, and at the ſame time highly celebrated for the regard they paid to the felicity of their people, by procuring them plenty of every thing, and particularly corn, wine, and oil. This period laſted during the reigns of the Septimian family. The *fourth ſeal* is diſtinguiſhed by a concurrence of evils, ſuch as war, famine, peſtilence, and wild beaſts; by all which the Roman empire was remarkably infeſted from the reign of Maximin to that of Diocleſian. The *fifth ſeal* begins at Diocleſian, and is ſignalized by the great perſecution, from whence aroſe that memorable era, the Era of Martyrs. With Conſtantine begins the *ſixth ſeal*, a period of revolutions, pictured forth by great commotions in earth and in heaven, alluding to the ſubverſion of Paganiſm and the eſtabliſhment of Chriſtianity. This period laſted from the reign of Conſtantine the Great to that of Theodoſius the firſt. The *ſeventh ſeal* includes under it the remaining parts of the prophecy, and comprehends ſeven periods diſtinguiſhed by the ſounding of ſeven trumpets.

As the ſeals foretold the ſtate of the Roman empire before and till it became Chriſtian, ſo the trumpets foreſhow the fate of it afterwards; each trumpet being an alarm to one nation or other, rouſing them up to overthrow that empire.

Four of theſe trumpets are ſounded in the eighth chapter.

At the ſounding of the firſt, Alaric and his Goths invade the Roman empire, beſiege Rome twice, and ſet it on fire in ſeveral places. At the ſounding of the ſecond, Attila and his Huns waſte the Roman provinces, and compel the eaſtern emperor Theodoſius the ſecond, and the weſtern emperor Valentinian the third, to ſubmit to ſhameful terms. At the ſounding of the third, Genſeric and his Vandals arrive from Africa; ſpoil and plunder Rome, and ſet ſail again with immenſe wealth and innumerable captives. At the ſounding of the fourth, Odoacer and the Heruli put an end to the very name of the weſtern empire; Theodoric founds the kingdom of the Oſtrogoths in Italy; and at laſt Italy becomes a province of the eaſtern empire, Rome being governed by a duke under the exarch of Ravenna. As the foregoing trumpets relate chiefly to the downfal of the weſtern empire, ſo do the following to that of the eaſtern. They are ſounded in the ninth, tenth, and part of the eleventh chapters. At the ſounding of the fifth trumpet, Mahomet, that blazing ſtar, appears, opens the bottomleſs pit, and with his locuſts the Arabians darkens the ſun and air. And at the ſounding of the ſixth, a period not yet finiſhed, the four angels, that is, the four ſultans, or leaders of the Turks and Othmans, are looſed from the river Euphrates. The Greek or Eaſtern empire was cruelly " hurt and tormented" under the fifth trumpet; but under the ſixth, was " ſlain," and utterly deſtroyed. Scripture.

The Latin or Weſtern Church not being reclaimed by the ruin of the Greek or Eaſtern, but ſtill perſiſting in their idolatry and wickedneſs; at the beginning of the tenth chapter, and under the ſound of this ſixth trumpet, is introduced a viſion preparative to the prophecies reſpecting the Weſtern Church, wherein an angel is repreſented, having in his hand a little book, or codicil, deſcribing the calamities that ſhould overtake that church. The meaſuring of the temple ſhows, that during all this period there will be ſome true Chriſtians, who will conform themſelves to the rule of God's word, even whilſt the outer court, that is, the external and more extenſive part of this temple or church, is trodden under foot by Gentiles, *i. e.* ſuch Chriſtians as, in their idolatrous worſhip and perſecuting practice, reſemble and outdo the Gentiles themſelves. Yet againſt theſe corrupters of religion there will always be ſome true witneſſes to proteſt, who, however they may be overborne at times, and in appearance reduced to death, yet will ariſe again from time to time, till at laſt they triumph and gloriouſly aſcend. The eleventh chapter concludes with the ſounding of the ſeventh trumpet.

In the twelfth chapter, by the woman bearing a man-child is to be underſtood the Chriſtian church; by the great red dragon, the heathen Roman empire; by the man-child whom the woman bore, Conſtantine the Great; and by the war in heaven, the conteſts between the Chriſtian and Heathen religions.

In the thirteenth chapter, by the beaſt with ſeven heads and ten horns, unto whom the dragon gave his power, ſeat, and great authority, is to be underſtood, not Pagan but Chriſtian, not imperial but papal Rome; in ſubmitting to whoſe religion, the world did in effect ſubmit again to the religion of the dragon. The ten-horned beaſt therefore repreſents the Romiſh church and ſtate in general: but the beaſt with two horns like a lamb is the Roman clergy; and that image of the ten-horned beaſt, which the two-horned beaſt cauſed to be made, and inſpired with life, is the pope; whoſe number is 666, according to the numerical powers of the letters conſtituting the Roman name Λατεινος, *Latinus*, or its equivalent in *Hebrew*, רומית *Romith*.

A	30	ר	200
A	1	ו	6
T	300	מ	40
E	5	י	10
I	10	י	10
N	50	ת	400
O	70		
Σ	200		
	666		666

Chapter xiv. By the lamb on Mount Sion is meant Jeſus; by the hundred forty and four thouſand, his church and followers; by the angel preaching the everlaſting

Scripture ‖ Scruple.

lasting gospel, the first principal effort made towards a reformation by that public opposition formed against the worship of saints and images by emperors and bishops in the eighth and ninth centuries; by the angel crying, "Babylon is fallen," the Waldenses and Albigenses, who pronounced the church of Rome to be the Apocalyptic Babylon, and denounced her destruction; and by the third angel Martin Luther and his fellow reformers, who protested against all the corruptions of the church of Rome, as destructive to salvation. For an account of the doctrines and precepts contained in the Scriptures, see THEOLOGY. For proofs of their divine origin, see RELIGION, PROPHECY, and MIRACLES.

SCRIVENER, one who draws contracts, or whose business it is to place money at interest. If a scrivener be entrusted with a bond, he may receive the interest; and if he fail, the obligee shall bear the loss: and so it is if he receive the principal and deliver up the bond; for being entrusted with the security itself, it must be presumed that he is trusted with power to receive interest or principal; and the giving up the bond on payment of the money shall be a discharge thereof. But if a scrivener shall be entrusted with a mortgage-deed, he hath only authority to receive the interest, not the principal; the giving up the deed in this case not being sufficient to restore the estate, but there must be a reconveyance, &c. It is held, where a scrivener puts out his client's money on a bad security, which upon inquiry might have been easily found so, yet he cannot in equity be charged to answer for the money; for it is here said, no one would venture to put out money of another upon a security, if he were obliged to warrant and make it good in case a loss should happen, without any fraud in him.

SCROBICULUS CORDIS, the same as ANTICARDIUM.

SCROFANELLO, in *Ichthyology*, a name by which some have called a small fish of the Mediterranean, more usually known by the name of the *scorpæna*.

SCROLL, in *Heraldry*. See that article, chap. iv. sect. 9. When the motto relates to the crest, the scroll is properly placed above the achievement; otherwise it should be annexed to the escutcheon. Those of the order of knighthood are generally placed round shields.

SCROPHULA, the KING'S EVIL. See MEDICINE, N° 349.

SCROPHULARIA, FIGWORT, a genus of plants belonging to the didynamia class, and in the natural method ranking under the 40th order, *Personatæ*. See BOTANY *Index*.

SCROTUM. See ANATOMY, N° 220.

SCRUPLE, SCRUPULUS, or *Scrupulum*, the least of the weights used by the ancients, which amongst the Romans was the 24th part of an ounce, or the 3d part of a dram. The scruple is still a weight among us, containing the 3d part of a dram, or 20 grains. Among goldsmiths it is 24 grains.

SCRUPLE, in *Chaldean Chronology*, is $\frac{1}{1080}$ part of an hour, called by the Hebrews *helakin*. These scruples are much used by the Jews, Arabs, and other eastern people, in computations of time.

SCRUPLES of half Duration, an arch of the moon's orbit, which the moon's centre describes from the beginning of an eclipse to its middle.

Scruple ‖ Scudding.

SCRUPLES of Immersion or *Incidence*, an arch of the moon's orbit, which her centre describes from the beginning of the eclipse to the time when its centre falls into the shadow.

SCRUPLES of Emersion, an arch of the moon's orbit, which her centre describes in the time from the first emersion of the moon's limb to the end of the eclipse.

SCRUTINY, (*Scrutinium*), in the primitive church, an examination or probation practised in the last week of Lent, on the catechumens, who were to receive baptism on the Easter-day. The scrutiny was performed with a great many ceremonies. Exorcisms and prayers were made over the heads of the catechumens; and on Palm Sunday, the Lord's Prayer and Creed were given them, which they were afterwards made to rehearse. This custom was more in use in the church of Rome than anywhere else; though it appears, by some missals, to have been likewise used, though much later, in the Gallican church. It is supposed to have ceased about the year 860. Some traces of this practice still remain at Vienne, in Dauphiné, and at Liege.

SCRUTINY, is also used, in the *Canon Law*, for a ticket or little paper billet, wherein at elections the electors write their votes privately, so as it may not be known for whom they vote. Among us the term *scrutiny* is chiefly used for a strict perusal and examination of the several votes hastily taken at an election; in order to find out any irregularities committed therein, by unqualified voters, &c.

SCRUTORE, or SCRUTOIR (from the French *escritoire*), a kind of cabinet, with a door or lid opening downwards, for conveniency of writing on, &c.

SCRY, in falconry, denotes a large flock of fowl.

SCUDDING, the movement by which a ship is carried precipitately before a tempest. As a ship flies with amazing rapidity through the water whenever this expedient is put in practice, it is never attempted in a contrary wind, unless when her condition renders her incapable of sustaining the mutual effort of the wind and waves any longer on her side, without being exposed to the most imminent danger of being overset.

A ship either scuds with a sail extended on her foremast, or, if the storm is excessive, without any sail: which, in the sea-phrase, is called *scudding under bare poles*. In sloops and schooners, and other small vessels, the sail employed for this purpose is called the *square sail*. In large ships, it is either the foresail at large, reefed, or with its goose-wings extended, according to the degree of the tempest; or it is the fore-top sail, close reefed, and lowered on the cap; which last is particularly used when the sea runs so high as to becalm the foresail occasionally, a circumstance which exposes the ship to the danger of broaching to. The principal hazards incident to scudding are generally, a pooping sea; the difficulty of steering, which exposes the vessel perpetually to the risk of broaching to; and the want of sufficient sea-room. A sea striking the ship violently on the stern may dash it inwards, by which she must inevitably founder. In broaching to (that is, inclining suddenly to windward), she is threatened with being immediately overturned; and, for want of sea-room, she is endangered

cudding, Sculponeæ. dangered by ſhipwreck on a lee-ſhore, a circumſtance too dreadful to require explanation.

SCULPONEÆ, among the Romans, a kind of ſhoes worn by ſlaves of both ſexes. Theſe ſhoes were only blocks of wood made hollow, like the French ſabots. Sculponeæ

SCULPTURE,

1 Definition of ſculpture. Origin of it,

IS the art of carving wood or hewing ſtone into images. It is an art of the moſt remote antiquity, being practiſed, as there is reaſon to believe, before the general deluge. We are induced to aſſign to it this early origin, by conſidering the expedients by which, in the firſt ſtages of ſociety, men have everywhere ſupplied the place of alphabetic characters. Theſe, it is univerſally known, have been picture-writing, ſuch as that of the Mexicans, which, in the progreſs of refinement and knowledge, was gradually improved into the hieroglyphics of the Egyptians and other ancient nations. See HIEROGLYPHICS.

That mankind ſhould have lived near 1700 years, from the creation of the world to the flood of Noah, without falling upon any method to make their conceptions permanent, or to communicate them to a diſtance, is extremely improbable; eſpecially when we call to mind that ſuch methods of writing have been found, in modern times, among people much leſs enlightened than thoſe muſt have been who were capable of building ſuch a veſſel as the ark. But if the antediluvians were acquainted with any kind of writing, there can be little doubt of its being hieroglyphical writing. Mr Bryant has proved that the Chaldeans were poſſeſſed of that art before the Egyptians; and Beroſus * informs us, that a delineation of all the monſtrous forms which inhabited the chaos, when this earth was in that ſtate, was to be ſeen in the temple of Belus in Babylon. This delineation, as he deſcribes it, muſt have been a hiſtory in hieroglyphical characters; for it conſiſted of human figures with wings, with two heads, and ſome with the horns and legs of goats. This is exactly ſimilar to the hieroglyphical writing of the Egyptians; and it was preſerved, our author ſays, both in drawings and *engravings* in the temple of the god of Babylon. As Chaldee was the firſt peopled region of the earth after the flood, and as it appears from Pliny †, as well as from Beroſus, that the art of engraving on bricks baked in the ſun was there carried to a conſiderable degree of perfection at a very early period, the probability certainly is, that the Chaldeans derived the art of hieroglyphical writing, and conſequently the rudiments of the art of ſculpture, from their antediluvian anceſtors.

* *Apud Syncellum*, p. 37.

† *Hiſt. Nat.* lib. vii. cap. 56.

It is generally thought that ſculpture had its origin from idolatry, as it was found neceſſary to place before the people the images of their gods to enliven the fervour of their devotion: but this is probably a miſtake. The worſhip of the heavenly bodies, as the only gods of the heathen nations, prevailed ſo long before the deification of dead men was thought of (ſee POLYTHEISM), that we cannot ſuppoſe mankind to have been, during all that time, ignorant of the art of hieroglyphical writing. But the deification of departed heroes undoubtedly gave riſe to the almoſt univerſal practice of repreſenting the gods by images of a human form; and therefore we muſt conclude, that the elements of ſculpture were known before that art was employed to enliven the devotion of idolatrous worſhippers. The pyramids and obeliſks of Egypt, which were probably temples, or rather altars, dedicated to the ſun (ſee PYRAMID), were covered from top to bottom with hieroglyphical emblems of men, beaſts, birds, fiſhes, and reptiles, at a period prior to that in which there is any unexceptionable evidence that mere ſtatue-worſhip prevailed even in that nurſery of idolatry.

not ſolely from idolatry;

3 though it probably contributed to carry the art to perfection.

But though it appears thus evident that picture-writing was the firſt employment of the ſculptor, we are far from imagining that idolatrous worſhip did not contribute to carry his art to that perfection which it attained in ſome of the nations of antiquity. Even in the dark ages of Europe, when the other fine arts were almoſt extinguiſhed, the mummery of the church of Rome, and the veneration which ſhe taught for her ſaints and martyrs, preſerved among the Italians ſome veſtiges of the ſiſter-arts of ſculpture and painting; and therefore, as human nature is everywhere the ſame, it is reaſonable to believe that a ſimilar veneration for heroes and demigods would, among the ancient nations, have a ſimilar effect. But if this be ſo, the preſumption is, that the Chaldeans were the firſt who invented the art of hewing blocks of wood and ſtone into the figures of men and other animals; for the Chaldeans were unqueſtionably the firſt idolaters, and their early progreſs in ſculpture is confirmed by the united teſtimonies of Beroſus, Alexander Polyhiſtor, Apollodorus, and Pliny; not to mention the eaſtern tradition, that the father of Abraham was a ſtatuary.

4 Mr Bromley's theory, that ſculpture was invented by the Scythians,

Againſt this concluſion Mr Bromley, in his late Hiſtory of the Fine Arts, has urged ſome plauſible arguments. In ſtating theſe he profeſſes not to be original, or to derive his information from the fountain-head of antiquity. He adopts, as he tells us, the theory of a French writer, who maintains, that in the year of the world 1949, about 300 years after the deluge, the Scythians under Brouma, a deſcendant of Magog the ſon of Japhet, extended their conqueſts over the greater part of Aſia. According to this ſyſtem, Brouma was not only the civilizer of India, and the author of the bramanical doctrines, but alſo diffuſed the principles of the Scythian mythology over Egypt, Phœnicia, Greece, and the continent of Aſia.

Of theſe principles Mr Bromley has given us no diſtinct enumeration; the account which he gives of them is not to be found in one place, but to be collected from a variety of diſtant paſſages. In attempting therefore to preſent the ſubſtance of his ſcattered hints in one view, we will not be confident that we have omitted none of them. The ox, ſays he, was the Scythian emblem of the generator of animal life, and hence it became the principal divinity of the Arabians. The ſerpent was the ſymbol of the ſource of intelligent nature. Theſe were the common points of union in all the firſt religions

religions of the earth. From Egypt the Iſraelites carried with them a religious veneration for the ox and the ſerpent. Their veneration for the ox appeared ſoon after they marched into the wilderneſs, when in the abſence of Moſes they called upon Aaron to make them gods which ſhould go before them. The idea of having an idol to go before them, ſays our author, was completely Scythian; for ſo the Scythians acted in all their progreſs through Aſia, with this difference, that their idol was a living animal. The Iſraelites having gained their favourite god, which was an ox (not a calf as it is rendered in the book of Exodus), next proceeded to hold a feſtival, which was to be accompanied with dancing; a ſpecies of gaiety common in the feſtivals which were held in adoration of the emblematic *Urotal* or ox in that very part of Arabia near Mount Sinai where this event took place. It is mentioned too as a curious and important fact, that the ox which was revered in Arabia was called *Adonai*. Accordingly Aaron announcing the feaſt to the ox or golden calf, ſpeaks thus, *to-morrow is a feaſt to Adonai*, which is in our tranſlation rendered *to the Lord*. In the time of Jeroboam we read of the golden calves ſet up as objects of worſhip at Bethel and Dan. Nor was the reverence paid to the ox confined to Scythia, to Egypt, and to Aſia; it extended much farther. The ancient Cimbri, as the Scythians did, carried an ox of bronze before them on all their expeditions. Mr Bromley alſo informs us, that as great reſpect was paid to the living ox among the Greeks as was offered to its ſymbol among other nations.

The emblem of the ſerpent, continues Mr Bromley, was marked yet more decidedly by the expreſs direction of the Almighty. That animal had ever been conſidered as emblematic of the ſupreme generating power of intelligent life: And was that idea, ſays he, diſcouraged, ſo far as it went to be a ſign or ſymbol of life, when God ſaid to Moſes, "Make thee a brazen ſerpent, and ſet it on a pole, and it ſhall come to paſs that every one who is bitten, when he looketh on it, ſhall live." In Egypt the ſerpent ſurrounded their Iſis and Oſiris, the diadems of their princes, and the bonnets of their prieſts. The ſerpent made a diſtinguiſhed figure in Grecian ſculpture. The fable of Echidne, the mother of the Scythians, gave her figure terminating as a ſerpent to all the founders of ſtates in Greece; from which their earlieſt ſculptors repreſented in that form the Titan princes, Cecrops, Draco, and even Ericthonius. Beſides the ſpear of the image of Minerva, which Phidias made for the citadel of Athens, he placed a ſerpent, which was ſuppoſed to guard that goddeſs.

The ſerpent was combined with many other figures. It ſometimes was coiled round an egg as an emblem of the creation; ſometimes round a trident, to ſhow its power over the ſea; ſometimes it encircled a flambeau, to repreſent life and death.

In Egypt, as well as in Scythia and India, the divinity was repreſented on the leaves of the tamara or lotus. Pan was worſhipped as a god in that country, as well as over the eaſt. Their ſphinxes, and all their combined figures of animal creation, took their origin from the mother of the Scythians, who brought forth an offſpring that was half a woman and half a ſerpent. Their pyramids and obeliſks aroſe from the idea of flame; the firſt emblem of the ſupreme principle, introduced by the Scythians, and which even the influence of Zoroaſter and the Magi could not remove.

We are told that the Bacchus of the Greeks is derived from the Brouma of the Indians; that both are repreſented as ſeated on a ſwan ſwimming over the waves, to indicate that each was the god of humid nature, not the god of wine, but the god of waters. The mitre of Bacchus was ſhaped like half an egg; an emblem taken from this circumſtance, that at the creation the egg from which all things ſprung was divided in the middle. Pan alſo was revered among the Scythians; and from that people were derived all the emblems by which the Greeks repreſented this divinity.

It would be tedious to follow our author through the whole of this ſubject; and were we to ſubmit to the labour of collecting and arranging his ſcattered materials, we ſhould ſtill view his ſyſtem with ſome degree of ſuſpicion. It is drawn, as he informs us, from the work of M. D'Ancarville, intitled, *Recherches ſur l'Origine, l'Eſprit, et les Progres, des Arts de la Grece.*

5 Ill founded.

To form concluſions concerning the origin of nations, the riſe and progreſs of the arts and ſciences, without the aid of hiſtorical evidence, by analogies which are ſometimes accidental, and often fanciful, is a mode of reaſoning which cannot readily be admitted. There may indeed, we acknowledge, be reſemblances in the religion, language, manners, and cuſtoms, of different nations, ſo ſtriking and ſo numerous, that to doubt of their being deſcended from the ſame ſtock would favour of ſcepticiſm. But hiſtorical theories muſt not be adopted raſhly. We muſt be certain that the evidence is credible and ſatisfactory before we proceed to deduce any concluſions. We muſt firſt know whether the Scythian hiſtory itſelf be authentic, before we make any compariſon with the hiſtory of other nations. But what is called the Scythian hiſtory, every man of learning knows to be a collection of fables. Herodotus and Juſtin are the two ancient writers from whom we have the fulleſt account of that warlike nation; but theſe two hiſtorians contradict each other, and both write what cannot be believed of the ſame people at the ſame period of their progreſs. Juſtin tells us, that there was a long and violent conteſt between the Scythians and Egyptians about the antiquity of their reſpective nations; and after ſtating the arguments on each ſide of the queſtion, which, as he gives them *, are nothing to the purpoſe, he decides in favour of the claim of the Scythians. Herodotus was too partial to the Egyptians, not to give them the palm of antiquity: and he was probably in the right; for Juſtin deſcribes his moſt ancient of nations, even in the time of Darius Hyſtaſpes, as ignorant of all the arts of civil life. "They occupied their land in common (ſays he), and cultivated none of it. They had no houſes nor ſettled habitations, but wandered with their cattle from deſert to deſert. In theſe rambles they carried their wives and children in tumbrels covered with the ſkins of beaſts, which ſerved as houſes to protect them from the ſtorms of winter. They were without laws, governed by the dictates of natural equity. They coveted not gold or ſilver like the reſt of mankind, and lived upon milk and honey. Though they were expoſed to extreme cold, and had abundance of flocks, they knew not how to make garments of wool, but clothed themſelves in the ſkins of

* Lib. ii. cap. 1.

wild beaſts †." This is the moſt favourable account which any ancient writer gives of the Scythians. By Strabo ‡ and Herodotus § they are repreſented as the moſt ſavage of mortals, delighting in war and bloodſhed, cutting the throats of all ſtrangers who came among them, eating their fleſh, and making cups and pots of their ſkulls. Is it conceivable that ſuch ſavages could be ſculptors; or that, even ſuppoſing their manners to have been ſuch as Juſtin repreſents them, a people ſo ſimple and ignorant could have impoſed their mythology upon the Chaldeans, Phenicians, and Egyptians, whom we know by the moſt incontrovertible evidence to have been great and poliſhed nations ſo early as in the days of Abraham? No! We could as ſoon admit other novelties of more importance, with which the French of the preſent age pretend to enlighten the world, as this origin aſſigned by Mr Bromley to the art of ſculpture, unleſs ſupported by better authority than that of D'Ancarville.

† Lib. ii. cap. 2.
‡ Lib. vii.
§ Lib. iv. cap. 62.

The inference of our author from the name of the ſacred ox in Arabia, and from the dancing and gaiety which were common in the religious feſtivals of the Arabians, appears to us to be very haſtily drawn. At the early period of the departure of the Iſraelites from Egypt, the language of the Hebrews, Egyptians, and Arabians, differed not more from each other than do the different dialects of the Greek tongue which are found in the poems of Homer (ſee PHILOLOGY, Sect. III.); and it is certain, that for many years after the formation of the golden-calf, the Hebrews were ſtrangers to every ſpecies of idolatry but that which they had brought with them from their houſe of bondage. See REMPHAN.

Taking for granted, therefore, that the Scythians did not impoſe their mythology on the eaſtern nations, and that the art of ſculpture, as well as hieroglyphic writing and idolatrous worſhip, prevailed firſt among the Chaldeans, we ſhall endeavour to trace the progreſs of this art through ſome other nations of antiquity, till we bring it to Greece, where it was carried to the higheſt perfection to which it has yet attained.

The firſt intimation that we have of the art of ſculpture is in the book of Geneſis, where we are informed, that when Jacob, by the divine command, was returning to Canaan, his wife Rachel carried along with her the teraphim or idols of her father. Theſe we are aſſured were ſmall, ſince Rachel found it ſo eaſy to conceal them from her father, notwithſtanding his anxious ſearch. We are ignorant, however, how theſe images were made, or of what materials they were compoſed. The firſt perſon mentioned as an artiſt of eminence is Bezaleel, who formed the cherubims which covered the mercy-ſeat.

6 Egyptian ſculpture.

The Egyptians alſo cultivated the art of ſculpture; but there were two circumſtances which obſtructed its progreſs, 1. The perſons of the Egyptians were not poſſeſſed of the graces of form, of elegance, or of ſymmetry; and of conſequence they had no perfect ſtandard to model their taſte. They reſembled the Chineſe in the caſt of their face, in their great bellies, and in the clumſy rounding of their contours. 2. They were reſtrained by their laws to the principles and practices of their anceſtors, and were not permitted to introduce any innovations. Their ſtatues were always formed in the ſame ſtiff attitude, with the arms hanging perpendicularly down the ſides. What perfection were they capable of who knew no other attitude than that of chairmen? So far were they from attempting any improvements, that in the time of Adrian the art continued in the ſame rude ſtate as at firſt; and when their ſlaviſh adulation for that emperor induced them to place the ſtatue of his favourite Antinous among the objects of their worſhip, the ſame inanimate ſtiffneſs in the attitude of the body and poſition of the arms was obſerved. We believe it will ſcarcely be neceſſary to inform our readers that the Egyptian ſtatue juſt now mentioned is very different from the celebrated ſtatue of Antinous, of which ſo many moulds have been taken that imitations of it are now to be met with almoſt in every cabinet in Europe.

Nothwithſtanding the attachment of the Egyptians to ancient uſages, Winkelman thinks he has diſcovered two different ſtyles of ſculpture which prevailed at different periods. The firſt of theſe ends with the conqueſt of Egypt by Cambyſes. The ſecond begins at that time, and extends beyond the reign of Alexander the Great. 7 In the firſt ſtyle, the lines which form the contour are ſtraight and projecting a little; the poſition is ſtiff and unnatural: In ſitting figures the legs are parallel, the feet ſqueezed together, and the arms fixed to the ſides; but in the figures of women the left arm is folded acroſs the breaſt; the bones and muſcles are faintly diſcernible; the eyes are flat and looking obliquely, and the eyebrows ſunk—features which deſtroy entirely the beauty of the head; the cheek-bones are high, the chin ſmall and piked; the ears are generally placed higher than in nature, and the feet are too large and flat. In ſhort, if we are to look for any model in the ſtatues of Egypt, it is not for the model of beauty but of deformity. The ſtatues of men are naked, only they have a ſhort apron, and a few folds of drapery ſurrounding their waiſt: The veſtments of women are only diſtinguiſhable by the border, which riſes a little above the ſurface of the ſtatue. In this age it is evident the Egyptians knew little of drapery.

Firſt ſtyle.

8 Second ſtyle.

Of the ſecond ſtyle of ſculpture practiced among the Egyptians, Winkelman thinks he has found ſpecimens in the two figures of baſaltes in the Capitol, and in another figure at Villa Albani, the head of which has been renewed. The firſt two of theſe, he remarks, bear viſible traces of the former ſtyle, which appear eſpecially in the form of the mouth and ſhortneſs of the chin. The hands poſſeſs more elegance; and the feet are placed at a greater diſtance from each other, than was cuſtomary in more ancient times. In the firſt and third figures the arms hang down cloſe to the ſides. In the ſecond they hang more freely. Winkelman ſuſpects that theſe three ſtatues have been made after the conqueſt of Egypt by the Greeks. They are clothed with a tunic, a robe, and a mantle. The tunic, which is puckered into many folds, deſcends from the neck to the ground. The robe in the firſt and third ſtatues ſeems cloſe to the body, and is only perceptible by ſome little folds. It is tied under the breaſt, and covered by the mantle, the two buttons of which are placed under the epaulet.

The Antinous of the Capitol is compoſed of two pieces, which are joined under the haunches. But as all the Egyptian ſtatues which now remain have been hewn out of one block, we muſt believe that Diodorus,

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in ſaying the ſtone was divided, and each half finiſhed by a ſeparate artizan, ſpoke only of a coloſſus. The ſame author informs us, that the Egyptians divided the human body into 24¼ parts; but it is to be regretted that he has not given a more minute detail of that diviſion.

The Egyptian ſtatues were not only formed by the chiſel, they were alſo poliſhed with great care. Even thoſe on the ſummit of an obeliſk, which could only be viewed at a diſtance, were finiſhed with as much labour and care as if they had admitted a cloſe inſpection. As they are generally executed in granite or baſaltes, ſtones of a very hard texture, it is impoſſible not to admire the indefatigable patience of the artiſts.

The eye was often of different materials from the reſt of the ſtatue; ſometimes it was compoſed of a precious ſtone or metal. We are aſſured that the valuable diamond of the empreſs of Ruſſia, the largeſt and moſt beautiful hitherto known, formed one of the eyes of the famous ſtatue of Scheringham in the temple of Brama.

Thoſe Egyptian ſtatues which ſtill remain are compoſed of wood or baked earth: and the ſtatues of earth are covered with green enamel.

9 Phenician ſculpture.

The Phenicians poſſeſſed both a character and ſituation highly favourable to the cultivation of ſtatuary. They had beautiful models in their own perſons, and their induſtrious character qualified them to attain perfection in every art for which they had a taſte. Their ſituation raiſed a ſpirit of commerce, and commerce induced them to cultivate the arts. Their temples ſhone with ſtatues and columns of gold, and a profuſion of emeralds was everywhere ſcattered. All the great works of the Phenicians have been unfortunately deſtroyed; but many of the Carthaginian medals are ſtill preſerved, ten of which are depoſited in the cabinet of the grand duke of Florence. But though the Carthaginians were a colony of Phenicians, we cannot from their works judge of the merit of their anceſtors.

10 This art not cultivated among the Perſians.

The Perſians made no diſtinguiſhed figure in the arts of deſign. They were indeed ſenſible to the charms of beauty, but they did not ſtudy to imitate them. Their dreſs, which conſiſted of long flowing robes concealing the whole perſon, prevented them from attending to the beauties of form. Their religion, too, which taught them to worſhip the divinity in the emblem of fire, and that it was impious to repreſent him under a human form, ſeemed almoſt to prohibit the exerciſe of this art, by taking away thoſe motives which alone could give it dignity and value; and as it was not cuſtomary among them to raiſe ſtatues to great men, it was impoſſible that ſtatuary could flouriſh in Perſia.

11 Etrurian ſculpture.

The Etrurians or ancient Tuſcans, in the opinion of Winkelman, carried this art to ſome degree of perfection at an earlier period than the Greeks. It is ſaid to have been introduced before the ſiege of Troy by Dedalus, who, in order to eſcape the reſentment of Minos king of Crete, took refuge in Sicily, from whence he paſſed into Italy, where he left many monuments of his art. Pauſanias and Diodorus Siculus informs us, that ſome works aſcribed to him were to be ſeen when they wrote, and that theſe poſſeſſed that character of majeſty which afterwards diſtinguiſhed the labours of Etruria.

A character ſtrongly marked forms the chief diſtinction in thoſe productions of Etruria which have deſcended to us. Their ſtyle was indeed harſh and overcharged; a fault alſo committed by Michael Angelo the celebrated painter of modern Etruria; for it is not to be ſuppoſed that a people of ſuch rude manners as the Etrurians could communicate to their works that vividneſs and beauty which the elegance of Grecian manners inſpired. On the other hand, there are many of the Tuſcan ſtatues which bear ſo cloſe a reſemblance to thoſe of Greece, that antiquarians have thought it probable that they were conveyed from that country, or Magna Græcia, into Etruria, about the time of the Roman conqueſt, when Italy was adorned with the ſpoils of Greece.

12 Firſt ſtyle.

Among the monuments of Etrurian art two different ſtyles have been obſerved. In the firſt the lines are ſtraight, the attitude ſtiff, and no idea of beauty appears in the formation of the head. The contour is not well rounded, and the figure is too ſlender. The head is oval, the chin piked, the eyes flat, and looking aſquint.

Theſe are the defects of an art in a ſtate of infancy, which an accompliſhed maſter could never fall into, and are equally conſpicuous in Gothic ſtatues as in the productions of the ancient natives of Florence. They reſemble the ſtyle of the Egyptians ſo much, that one is almoſt induced to ſuppoſe that there had once been a communication between theſe two nations; but others think that this ſtyle was introduced by Dedalus.

13 Second ſtyle.

Winkelman ſuppoſes that the ſecond epoch of this art commenced in Etruria, about the time at which it had reached its greateſt perfection in Greece, in the age of Phidias; but this conjecture is not ſupported by any proofs. To deſcribe the ſecond ſtyle of ſculpture among the Etrurians, is almoſt the ſame as to deſcribe the ſtyle of Michael Angelo and his numerous imitators. The joints are ſtrongly marked, the muſcles raiſed, the bones diſtinguiſhable; but the whole mien harſh. In deſigning the bone of the leg, and the ſeparation of the muſcles of the calf, there is an elevation and ſtrength above life. The ſtatues of the gods are deſigned with more delicacy. In forming them, the artiſts were anxious to ſhow that they could exerciſe their power without that violent diſtenſion of the muſcles which is neceſſary in the exertions of beings merely human; but in general their attitudes are unnatural, and the actions ſtrained. If a ſtatue, for inſtance, hold any thing with its fore fingers, the reſt are ſtretched out in a ſtiff poſition.

According to ancient hiſtory, the Greeks did not emerge from the ſavage ſtate till a long time after the Egyptians, Chaldeans, and Indians, had arrived at a conſiderable degree of civilization. The original rude inhabitants of Greece were civilized by colonies which arrived among them, at different times, from Egypt and Phenicia. Theſe brought along with them the religion, the letters, and the arts of their parent countries: and if ſculpture had its origin from the worſhip of idols, there is reaſon to believe that it was one of the arts which were thus imported; for that the gods of Greece were of Egyptian and Phenician extraction is a fact incontrovertible; (ſee MYSTERIES, MYTHOLOGY, PHILOLOGY, Sect. VII. PHILOSOPHY, N° 19, and TITAN). The original ſtatues of the gods, however, were very rude. The earlieſt objects of idolatrous

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worſhip have everywhere been the heavenly bodies; and the ſymbols conſecrated to them were generally pillars of a conical or pyramidal figure. It was not till hero-worſhip was engrafted on the planetary, that the ſculptor thought of giving to the ſacred ſtatue any part of the human form (ſee POLYTHEISM, N° 19, 23.); and it appears to have been about the era of their revolution in idolatry that the art of ſculpture was introduced among the Greeks. The firſt repreſentations of their gods were round ſtones placed upon cubes or pillars; and theſe ſtones they afterwards formed roughly, ſo as to give them ſomething of the appearance of a head. Agreeable to this deſcription was a Jupiter, which Pauſanias ſaw in Tegeum, in Arcadia. Theſe repreſentations were called *Hermes;* not that they repreſented Mercury, but from the word *Herma*, which ſignified a rough ſtone. It is the name which Homer gives to the ſtones which were uſed to fix veſſels to the ſhore. Pauſanias ſaw at Pheres 30 deities made of unformed blocks or cubical ſtones. The Lacedemonians repreſented Caſtor and Pollux by two parallel poſts; and a tranſverſe beam was added, to expreſs their mutual affection.

If the Greeks derived from foreign nations the rudiments of the arts, it muſt redound much to their honour, that in a few centuries they carried them to ſuch wonderful perfection as entirely to eclipſe the fame of their maſters. It is by tracing the progreſs of ſculpture among them that we are to ſtudy the hiſtory of this art; and we ſhall ſee its origin and ſucceſſive improvements correſpond with nature, which always operates ſlowly and gradually.

VIEW OF GRECIAN SCULPTURE.

14 Cauſes which promoted the art of ſculpture in Greece.

THE great ſuperiority of the Greeks in the art of ſculpture may be aſcribed to a variety of cauſes. The influence of climate over the human body is ſo ſtriking, that it muſt have fixed the attention of every thinking man who has reflected on the ſubject. The violent heats of the torrid zone, and the exceſſive cold of the polar regions, are unfavourable to beauty. It is only in the mild climates of the temperate regions that it appears in its moſt attractive charms. Perhaps no country in the world enjoys a more ſerene air, leſs tainted with miſts and vapours, or poſſeſſes in a higher degree that mild and genial warmth which can unfold and expand the human body into all the ſymmetry of muſcular ſtrength, and all the delicacies of female beauty in greater perfection, than the happy climate of Greece; and never was there any people that had a greater taſte for beauty, or were more anxious to improve it. Of the four wiſhes of Simonides, the ſecond was to have a handſome figure. The love of beauty was ſo great among the Lacedemonian women, that they kept in their chambers the ſtatues of Nereus, of Narciſſus, of Hyacinthus, and of Caſtor and Pollux; hoping that by often contemplating them they might have beautiful children.

There was a variety of circumſtances in the noble and virtuous freedom of the Grecian manners that rendered theſe models of beauty peculiarly ſubſervient to the cultivation of the fine arts. There were no tyrannical laws, as among the Egyptians, to check their progreſs. They had the beſt opportunities to ſtudy them in the public places, where the youth, who needed no other veil than chaſtity and purity of manners, performed their various exerciſes quite naked. They had the ſtrongeſt motives to cultivate ſculpture, for a ſtatue was the higheſt honour which public merit could attain. It was an honour ambitiouſly ſought, and granted only to thoſe who had diſtinguiſhed themſelves in the eyes of their fellow citizens. As the Greeks preferred natural qualities to acquired accompliſhments, they decreed the firſt rewards to thoſe who excelled in agility and ſtrength of body. Statues were often raiſed to wreſtlers. Even the moſt eminent men of Greece, in their youth, ſought renown in gymnaſtic exerciſes. Chryſippus and Cleanthes diſtinguiſhed themſelves in the public games before they were known as philoſophers. Plato appeared as a wreſtler both at the Iſthmian and Pythian games; and Pythagoras carried off the prize at Elis, (ſee PYTHAGORAS). The paſſion by which they were inſpired was the ambition of having their ſtatues erected in the moſt ſacred place of Greece, to be ſeen and admired by the whole people. The number of ſtatues erected on different occaſions was immenſe; of courſe the number of artiſts muſt have been great, their emulation ardent, and their progreſs rapid.

As moſt of their ſtatues were decreed for thoſe who vanquiſhed in the public games, the artiſts had the opportunity of ſeeing excellent models; for thoſe who ſurpaſſed in running, boxing, and wreſtling, muſt in general have been well formed, yet would exhibit different kinds of beauty.

The high eſtimation in which ſculptors were held was very favourable to their art. Socrates declared the artiſts the only wiſe men. An artiſt could be a legiſlator, a commander of armies, and might hope to have his ſtatue placed beſide thoſe of Miltiades and Themiſtocles, or thoſe of the gods themſelves. Beſides, the honour and ſucceſs of an artiſt did not depend on the caprice of pride or of ignorance. The productions of art were eſtimated and rewarded by the greateſt ſages in the general aſſembly of Greece, and the ſculptor who had executed his work with ability and taſte was confident of obtaining immortality.

It was the opinion of Winkelman, that liberty was highly favourable to this art; but, though liberty is abſolutely neceſſary to the advancement of ſcience, it may be doubted whether the fine arts owe their improvement to it. Sculpture flouriſhed moſt in Greece, when Pericles exerciſed the power of a king; and in the reign of Alexander, when Greece was conquered. It attained no perfection in Rome till Auguſtus had enſlaved the Romans. It revived in Italy under the patronage of the family of Medici, and in France under the deſpotic rule of Louis XIV. It is the love of beauty, luxury, wealth, or the patronage of a powerful individual, that promotes the progreſs of this art.

15 Grecian ideas of beauty.

It will now be proper to give a particular account of the ideas which the Greeks entertained concerning the ſtandard of beauty in the different parts of the human body. And with reſpect to the head, the profile which they chiefly admired is peculiar to dignified beauty. It conſiſts in a line almoſt ſtraight, or marked by ſuch ſlight and gentle inflections as are ſcarcely diſtinguiſhable from a ſtraight line. In the figures of women and young perſons, the forehead and noſe form a line approaching to a perpendicular.

16 The profile.

Ancient

17 The forehead.

Ancient writers, as well as artiſts, aſſure us that the Greeks reckoned a ſmall forehead a mark of beauty, and a high forehead a deformity. From the ſame idea, the Circaſſians wore their hair hanging down over their foreheads almoſt to their eyebrows. To give an oval form to the countenance, it is neceſſary that the hair ſhould cover the forehead, and thus make a curve about the temples; otherwiſe the face, which terminates in an oval form in the inferior part, will be angular in the higher part, and the proportion will be deſtroyed. This rounding of the forehead may be ſeen in all handſome perſons, in all the heads of ideal beauty in ancient ſtatues, and eſpecially in thoſe of youth. It has been overlooked, however, by modern ſtatuaries. Bernini, who modelled a ſtatue of Louis XIV. in his youth, turned back the hair from the forehead.

18 The eyes.

It is generally agreed that large eyes are beautiful; but their ſize is of leſs importance in ſculpture than their form, and the manner in which they are enchaſed. In ideal beauty, the eyes are always ſunk deeper than they are in nature, and conſequently the eyebrows have a greater projection. But in large ſtatues, placed at a certain diſtance, the eyes, which are of the ſame colour with the reſt of the head, would have little effect if they were not ſunk. By deepening the cavity of the eye, the ſtatuary increaſes the light and ſhade, and thus gives the head more life and expreſſion. The ſame practice is uſed in ſmall ſtatues. The eye is a characteriſtic feature in the heads of the different deities. In the ſtatues of Apollo, Jupiter, and Juno, the eye is large and round. In thoſe of Pallas they are alſo large; but by lowering the eyelids, the virgin air and expreſſion of modeſty are delicately marked. Venus has ſmall eyes, and the lower eyelid being raiſed a little, gives them a languiſhing look and enchanting ſweetneſs. It is only neceſſary to ſee the Venus de Medicis to be convinced that large eyes are not eſſential to beauty, eſpecially if we compare her ſmall eyes with thoſe which reſemble them in nature. The beauty of the eyebrows conſiſts in the fineneſs of the hair, and in the ſharpneſs of the bone which covers them; and maſters of the art conſidered the joining of the eyebrows as a deformity, though it is ſometimes to be met with in ancient ſtatues.

19 The mouth.

The beauty of the mouth is peculiarly neceſſary to conſtitute a fine face. The lower lip muſt be fuller than the upper, in order to give an elegant rounding to the chin. The teeth ſeldom appear, except in laughing ſatyrs. In human figures the lips are generally cloſe, and a little opened in the figures of the gods, The lips of Venus are half open.

In figures of ideal beauty, the Grecian artiſts never interrupted the rounding of the chin by introducing a dimple: for this they conſidered not as a mark of beauty, and only to be admitted to diſtinguiſh individuals. The dimple indeed appears in ſome ancient ſtatues, but antiquaries ſuſpect it to be the work of a modern hand. It is ſuſpected alſo, that the dimple which is ſometimes found on the cheeks of ancient ſtatues is a modern innovation.

20 The ears.

No part of the head was executed by the ancients with more care than the ears, though little attention has been given to them by modern artiſts. This character is ſo deciſive, that if we obſerve in any ſtatue that the ears are not highly finiſhed, but only roughly marked, we may conclude with certainty that we are examining a modern production. The ancients were very attentive to copy the preciſe form of the ear in taking likeneſſes. Thus, where we meet with a head the ears of which have a very large interior opening, we know it to be the head of Marcus Aurelius.

21 The hair.

The manner in which the ancient artiſts formed the hair alſo enables us to diſtinguiſh their works from thoſe of the moderns. On hard and coarſe ſtones the hair was ſhort, and appeared as if it had been combed with a wide comb; for that kind of ſtone was difficult to work, and could not without immenſe labour be formed into curled and flowing hair. But the figures executed in marble in the moſt flouriſhing period of the art have the hair curled and flowing; at leaſt where the head was not intended to be an exact reſemblance, for then the artiſt conformed to his model. In the heads of women, the hair was thrown back, and tied behind in a waving manner, leaving conſiderable intervals; which gives the agreeable variety of light and ſhade, and produces the effects of the claro-obſcuro. The hair of the Amazons is diſpoſed in this manner. Apollo and Bacchus have their hair falling down their ſhoulders; and young perſons, till they arrived at manhood, wore their hair long. The colour of the hair which was reckoned moſt beautiful, was fair; and this they gave without diſtinction to the moſt beautiful of their gods, Apollo and Bacchus, and likewiſe to their moſt illuſtrious heroes.

22 The hands.

Although the ravages of time have preſerved but few of the hands or feet of ancient ſtatues, it is evident from what remains how anxious the Grecian artiſts were to give every perfection to theſe parts. The hands of young perſons were moderately plump, with little cavities or dimples at the joints of the fingers. The fingers tapered very gently from the root to the point, like well-proportioned columns, and the joints were ſcarcely perceptible. The terminating joint was not bent, as it commonly appears in modern ſtatues.

23 The legs and feet.

In the figures of young men the joints of the knee are faintly marked. The knee unites the leg to the thigh without making any remarkable projections or cavities. The moſt beautiful legs and beſt-turned knees, according to Winkelman, are preſerved in the Apollo Saurocthones, in the Villa Borgheſe; in the Apollo which has a ſwan at its feet; and in the Bacchus of Villa Medicis. The ſame able connoiſſeur remarks, it is rare to meet with beautiful knees in young perſons, or in the elegant repreſentations of art. As the ancients did not cover the feet as we do, they gave to them the moſt beautiful turning, and ſtudied the form of them with the moſt ſcrupulous attention.

24 The breaſt and lower part of the body.

The breaſts of men were large and elevated. The breaſts of women did not poſſeſs much amplitude. The figures of the deities have always the breaſts of a virgin, the beauty of which the ancients made to conſiſt in a gentle elevation. So anxious were the women to reſemble this ſtandard, that they uſed ſeveral arts to reſtrain the growth of their breaſts. The breaſts of the nymphs and goddeſſes were never repreſented ſwelling, becauſe that is peculiar to thoſe women who ſuckle. The paps of Venus contract and end in a point, this being conſidered as an eſſential characteriſtic of perfect beauty. Some of the moderns have tranſgreſſed theſe rules, and have fallen into great improprieties.

The

The lower part of the body in the ſtatues of men was formed like that of the living body after a profound ſleep and good digeſtion. The navel was conſiderably ſunk, eſpecially in female ſtatues.

25 Ideal beauty. As beauty never appears in equal perfection in every part of the ſame individual, perfect or ideal beauty can only be produced by ſelecting the moſt beautiful parts from different models; but this muſt be done with ſuch judgement and care, that theſe detached beauties when united may form the moſt exact ſymmetry. Yet the ancients ſometimes confined themſelves to one individual, even in the moſt flouriſhing age. Theodorus, whom Socrates and his diſciples viſited, ſerved as a model to the artiſts of his time. Phryne alſo appears to have been a model to the painters and ſculptors. But Socrates, in his converſation with Parrhaſius, ſays, that when a perfect beauty was to be produced, the artiſts joined together the moſt ſtriking beauties which could be collected from the fineſt figures. We know that Zeuxis, when he was going to paint Helen, united in one picture all the beauties of the moſt handſome women of Crotona.

26 The drapery of ſtatues. THE Grecian ſculptors, who repreſented with ſuch ſucceſs the moſt perfect beauty of the human form, were not regardleſs of the drapery of their ſtatues. They clothed their figures in the moſt proper ſtuff, which they wrought into that ſhape which was beſt calculated to give effect to their deſign.

The veſtments of women in Greece generally conſiſted of linen cloth, or ſome other light ſtuff, and in latter times of ſilk and ſometimes of woollen cloth. They had alſo garments embroidered with gold. In the works of ſculpture, as well as in thoſe of painting, one may diſtinguiſh the linen by its tranſparency and ſmall united folds. The other light ſtuffs which were worn by the women (A) were generally of cotton produced in the iſle of Cos; and theſe the art of ſtatuary was able to diſtinguiſh from the linen veſtments. The cotton cloth was ſometimes ſtriped, and ſometimes embelliſhed with a profuſion of flowers. Silk was alſo employed; but whether it was known in Greece before the time of the Roman emperors cannot eaſily be determined. In paintings, it is diſtinguiſhable by changing its colour in different lights to red, violet, and ſky-blue. There were two ſorts of purple; that which the Greeks called the *colour of the ſea*, and Tyrian purple, which reſembled lac. Woollen garments are eaſily known by the amplitude of their folds. Beſides theſe, cloth of gold ſometimes compoſed their drapery: but it was not like the modern fabric, conſiſting of a thread of gold or of ſilver ſpun with a thread of ſilk; it was compoſed of gold or ſilver alone, without any mixture.

The veſtments of the Greeks, which deſerve particular attention, are the tunic, the robe, and the mantle.

27 The tunic. The tunic was that part of the dreſs which was next to the body. It may be ſeen in ſleeping figures, or in thoſe in diſhabille; as in the Flora Farneſe, and in the ſtatues of the Amazons in the Capitol. The youngeſt of the daughters of Niobe, who throws herſelf at her mother's ſide, is clothed only with a tunic. It was of linen, or ſome other light ſtuff, without ſleeves, fixed to the ſhoulders by a button, ſo as to cover the whole breaſt. None but the tunics of the goddeſs Ceres and comedians have long ſtraight ſleeves.

28 The robe. The robes of women commonly conſiſted of two long pieces of woollen cloth, without any particular form, attached to the ſhoulders by a great many buttons, and ſometimes by a claſp. They had ſtraight ſleeves which came down to the wriſts. The young girls, as well as the women, faſtened their robe to their ſide by a cincture, in the ſame way as the high-prieſt of the Jews faſtened his, as it is ſtill done in many parts of Greece. The cincture formed on the ſide a knot of ribbons ſometimes reſembling a roſe in ſhape, which has been particularly remarked in the two beautiful daughters of Niobe. In the younger of theſe the cincture is ſeen paſſing over the ſhoulders and the back. Venus has two cinctures, the one paſſing over the ſhoulder, and the other ſurrounding the waiſt. The latter is called *ceſtus* by the poets.

29 The mantle. The mantle was called *peplon* by the Greeks, which ſignifies properly the mantle of Pallas. The name was afterwards applied to the mantles of the other gods, as well as to thoſe of men. This part of the dreſs was not ſquare, as ſome have imagined, but of a roundiſh form. The ancients indeed ſpeak in general of ſquare mantles, but they received this ſhape from four taſſels which were affixed to them; two of theſe were viſible, and two were concealed under the mantle. The mantle was brought under the right arm, and over the left ſhoulder; ſometimes it was attached to the ſhoulder by two buttons, as may be ſeen in the beautiful ſtatue of Leucothoe at Villa Albani.

30 The colour of veſtments. The colour of veſtments peculiar to certain ſtatues is too curious to be omitted. To begin with the figures of the gods.—The drapery of Jupiter was red, that of Neptune is ſuppoſed by Winkelman to have been ſea-green. The ſame colour alſo belonged to the Nereids and Nymphs. The mantle of Apollo was blue or violet. Bacchus was dreſſed in white. Martianus Capella aſſigns green to Cybele. Juno's veſtments were ſky-blue, but ſhe ſometimes had a white veil. Pallas was robed in a flame-coloured mantle. In a painting of Herculaneum, Venus is in flowing drapery of a golden yellow. Kings were arrayed in purple; prieſts in white; and conquerors ſometimes in ſea-green.

With reſpect to the head, women generally wore no covering but their hair; when they wiſhed to cover their head, they uſed the corner of their mantle.—Sometimes we meet with veils of a fine tranſparent texture. Old women wore a kind of bonnet upon their head, an example of which may be ſeen in a ſtatue in the Capitol, called the *Præfica;* but Winkelman thinks it is a ſtatue of Hecuba.

The covering of the feet conſiſted of ſhoes or ſandals. The ſandals were generally an inch thick, and compoſed of more than one ſole of cork. Thoſe of Pallas in Villa Albani has two ſoles, and other ſtatues had no leſs than five.

WINKELMAN

(A) Men ſometimes wore cotton, but all who did ſo were reckoned effeminate.

31 Four ſtyles of this art among the Greeks.

WINKELMAN has aſſigned four different ſtyles to this art. The *ancient* ſtyle, which continued until the time of Phidias; the *grand* ſtyle, formed by that celebrated ſtatuary; the *beautiful*, introduced by Praxiteles, Apelles, and Lyſippus; and the *imitative* ſtyle, practiſed by thoſe artiſts who copied the works of the ancient maſters.

32 The ancient ſtyle.

The moſt authentic monuments of the ancient ſtyle are medals, containing an inſcription, which leads us back to very diſtant times. The writing is from right to left in the Hebrew manner; a uſage which was abandoned before the time of Herodotus. The ſtatue of Agamemnon at Elis, which was made by Ornatas, has an inſcription from right to left. This artiſan flouriſhed 50 years before Phidias; it is in the intervening period therefore between theſe two artiſts, that we are to look for the ceſſation of this practice. The ſtatues formed in the ancient ſtyle were neither diſtinguiſhed by beauty of ſhape nor by proportion, but bore a cloſe reſemblance to thoſe of the Egyptians and Etrurians (B); the eyes were long and flat; the ſection of the mouth not horizontal; the chin was pointed; the curls of the hair were ranged in little rings, and reſembled grains incloſed in a heap of raiſins. What was ſtill worſe, it was impoſſible by inſpecting the head to diſtinguiſh the ſex.

The characters of this ancient ſtyle were theſe: The deſigning was energetic, but harſh; it was animated, but without gracefulneſs; and the violence of the expreſſion deprived the whole figure of beauty.

33 The grand ſtyle.

The grand ſtyle was brought to perfection by Phidias, Polycletus, Scopas, Alcamenes, Myron, and other illuſtrious artiſts. It is probable, from ſome paſſages of ancient writers, that in this ſtyle were preſerved ſome characters of the ancient manner, ſuch as the ſtraight lines, the ſquares and angles. The ancient maſters, ſuch as Polycletus, being the legiſlators of proportions, ſays Winkelman, and of conſequence thinking they had a right to diſtribute the meaſures and dimenſions of the parts of the human body, have undoubtedly ſacrificed ſome degree of the form of beauty to a grandeur which is harſh, in compariſon of the flowing contours and graceful forms of their ſucceſſors.—The moſt conſiderable monuments of the grand ſtyle are the ſtatues of Niobe and her daughters, and a figure of Pallas, to be ſeen in Villa Albani; which, however, muſt not be confounded with the ſtatue which is modelled according to the firſt ſtyle, and is alſo found in the ſame place. The head poſſeſſes all the characters of dignified beauty, at the ſame time exhibiting the rigidneſs of the ancient ſtyle. The face is defective in gracefulneſs; yet it is evident how eaſy it would have been to give the features more roundneſs and grace. The figures of Niobe and her daughters have not, in the opinion of Winkelman, that auſterity of appearance which marks the age of the ſtatue of Pallas. They are characteriſed by grandeur and ſimplicity: ſo ſimple are the forms, that they do not appear to be the tedious productions of art, but to have been created by an inſtantaneous effort of nature.

34 The graceful ſtyle.

The third ſtyle was the graceful or beautiful. Lyſippus was perhaps the artiſt who introduced this ſtyle. Being more converſant than his predeceſſors with the ſweet, the pure, the flowing, and the beautiful lines of nature, he avoided the ſquare forms which the maſters of the ſecond ſtyle had too much employed. He was of opinion that the uſe of the art was rather to pleaſe than to aſtoniſh, and that the aim of the artiſt ſhould be to raiſe admiration by giving delight. The artiſts who cultivated this ſtyle did not, however, neglect to ſtudy the ſublime works of their predeceſſors. They knew that grace is conſiſtent with the moſt dignified beauty, and that it poſſeſſes charms which muſt ever pleaſe: they knew alſo that theſe charms are enhanced by dignity. Grace is infuſed into all the movements and attitudes of their ſtatues, and it appears in the delicate turns of the hair, and even in the adjuſting of the drapery. Every ſort of grace was well known to the ancients; and great as the ravages of time have been amongſt the works of art, ſpecimens are ſtill preſerved, in which can be diſtinguiſhed *dignified* beauty, *attractive* beauty, and a beauty *peculiar to infants*. A ſpecimen of dignified beauty may be ſeen in the ſtatue of one of the muſes in the palace of Barberini at Rome; and in the garden of the pope, on the Quirinal, is a ſtatue of another muſe, which affords a fine inſtance of attractive beauty. Winkelman ſays that the moſt excellent model of infant beauty which antiquity has tranſmitted to us is a ſatyr of a year old, which is preſerved, though a little mutilated, in Villa Albani.

35 The imitative ſtyle.

The great reputation of Praxiteles and Apelles raiſed an ardent emulation in their ſucceſſors, who deſpairing to ſurpaſs ſuch illuſtrious maſters, were ſatisfied with imitating their works. But it is well known that a mere imitator is always inferior to the maſter whom he attempts to copy. When no original genius appears, the art muſt therefore decline.

36 Materials of Grecian ſtatues.

CLAY was the firſt material which was employed in ſtatuary. An inſtance of this may be ſeen in a figure of Alcamenes in bas-relief in Villa Albani. The ancients uſed their fingers, and eſpecially their nails, to render certain parts more delicate and lively: hence aroſe the phraſe *ad unguem factus homo*, "an accompliſhed man." It was the opinion of Count Caylus that the ancients did not uſe models in forming their ſtatues. But to diſprove this, it is only neceſſary to mention an engraving on a ſtone in the cabinet of Stoſch, which repreſents Prometheus engraving the figure of a man, with a plummet in his hand to meaſure the proportions of his model. The ancients as well as the moderns made works in plaſter; but no ſpecimens remain except ſome figures in bas-relief, of which the moſt beautiful were found at Baia.

37 Clay and plaſter.

38 Ivory, ſilver, and gold.

The works made of ivory and ſilver were generally of a ſmall ſize. Sometimes, however, ſtatues of a prodigious ſize were formed of gold and ivory. The coloſſal Minerva of Phidias, which was compoſed of theſe materials, was 26 cubits high. It is indeed ſcarcely poſſible

(B) This is a proof additional to thoſe that will be found in the articles to which we have referred, that the Greeks received the rudiments of the art of ſculpture from the nations to which they were confeſſedly indebted for the elements of ſcience.

poſſible to believe that ſtatues of ſuch a ſize could entirely conſiſt of gold and ivory. The quantity of ivory neceſſary to a coloſſal ſtatue is beyond conception. M. de Paw calculates that the ſtatue of Jupiter Olympus, which was 54 feet high, would conſume the teeth of 300 elephants.

39 Marble. The Greeks generally hewed their marble ſtatues out of one block, though they after worked the heads ſeparately, and ſometimes the arms. The heads of the famous group of Niobe and her daughters have been adapted to their bodies after being ſeparately finiſhed. It is proved by a large figure repreſenting a river, which is preſerved in Villa Albani, that the ancients firſt hewed their ſtatues roughly before they attempted to ſiniſh any part. When the ſtatue had received its perfect figure, they next proceeded to poliſh it with pumice-ſtone, and again carefully retouched every part with the chiſel.

40 Porphyry. The ancients, when they employed porphyry, uſually made the head and extremities of marble. It is true, that at Venice there are four figures entirely compoſed of porphyry; but theſe are the productions of the Greeks of the middle age. They alſo made ſtatues of baſaltes and alabaſter.

41 Expreſſion and attitude. WITHOUT expreſſion, geſture, and attitude, no figure can be beautiful, becauſe in theſe the graces always reſide. It was for this reaſon that the graces are always repreſented as the companions of Venus.

The expreſſion of tranquillity was frequent in Grecian ſtatues, becauſe, according to Plato, that was conſidered as the middle ſtate of the ſoul between pleaſure and pain. Experience, too, ſhows that in general the moſt beautiful perſons are endowed with the ſweeteſt and moſt engaging manner. Without a ſedate tranquillity dignified beauty could not exiſt. It is in this tranquillity, therefore, that we muſt look for the complete diſplay of genius.

42 In the ſtatues of the gods. The moſt elevated ſpecies of tranquillity and repoſe was ſtudied in the figures of the gods. The father of the gods, and even inferior divinities, are repreſented without emotion or reſentment. It is thus that Homer paints Jupiter ſhaking Olympus by the motion of his hair and his eyebrows.

> Shakes his ambroſial curls, and gives the nod,
> The ſtamp of fate and ſanction of the god.

Jupiter is not always exhibited in this tranquil ſtate. In a bas-relief belonging to the marquis Rondini he appears ſeated on an arm-chair with a melancholy aſpect. The Apollo of the Vatican repreſents the god in a fit of rage againſt the ſerpent Python, which he kills at a blow. The artiſt, adopting the opinion of the poets, has made the noſe the ſeat of anger, and the lips the ſeat of diſdain.

43 In the ſtatues of heroes. To expreſs the action of a hero, the Grecian ſculptors delineated the countenance of a noble virtuous character repreſſing his groans, and allowing no expreſſion of pain to appear. In deſcribing the actions of a hero the poet has much more liberty than the artiſt. The poet can paint them ſuch as they were before men were taught to ſubdue their paſſions by the reſtraints of law, or the refined cuſtoms of ſocial life. But the artiſt, obliged to ſelect the moſt beautiful forms, is reduced to the neceſſity of giving ſuch an expreſſion of the paſſions as may not ſhock our feelings and diſguſt us with his production. The truth of theſe remarks will be acknowledged by thoſe who have ſeen two of the moſt beautiful monuments of antiquity; one of which repreſents the fear of death, the other the moſt violent pains and ſufferings. The daughters of Niobe, againſt whom Diana has diſcharged her fatal arrows, are exhibited in that ſtate of ſtupefaction which we imagine muſt take place when the certain proſpect of death deprives the ſoul of all ſenſibility. The fable preſents us an image of that ſtupor which Eſchylus deſcribes as ſeizing the daughters of Niobe when they were transformed into a rock. The other monument referred to is the image of Laocoon, which exhibits the moſt agonizing pain that can affect the muſcles, the nerves, and the veins. The ſufferings of the body and the elevation of the ſoul are expreſſed in every member with equal energy, and form the moſt ſublime contraſt imaginable. Laocoon appears to ſuffer with ſuch fortitude, that, whilſt his lamentable ſituation pierces the heart, the whole figure fills us with an ambitious deſire of imitating his conſtancy and magnanimity in the pains and ſufferings that may fall to our lot.

Philoctetes is introduced by the poets ſhedding tears, uttering complaints, and rending the air with his groans and cries; but the artiſt exhibits him ſilent and bearing his pains with dignity. The Ajax of the celebrated painter Timomachus is not drawn in the act of deſtroying the ſheep which he took for the Grecian chiefs, but in the moments of reflection which ſucceeded that frenzy. So far did the Greeks carry their love of calmneſs and ſlow movements, that they thought a quick ſtep always announced ruſticity of manners. Demoſthenes reproaches Nicobulus for this very thing; and from the words he makes uſe of, it appears, that to ſpeak with inſolence and to walk haſtily were reckoned ſynonymous.

44 In the ſtatues of women. In the figures of women, the artiſts have conformed to the principle obſerved in all the ancient tragedies, and recommended by Ariſtotle, never to make women ſhow too much intrepidity or exceſſive cruelty. Conformable to this maxim, Clytemneſtra is repreſented at a little diſtance from the fatal ſpot, watching the murderer, but without taking any part with him. In a painting of Timomachus repreſenting Medea and her children, when Medea lifts up the dagger they ſmile in her face, and her fury is immediately melted into compaſſion for the innocent victims. In another repreſentation of the ſame ſubject, Medea appears heſitating and indeciſive. Guided by the ſame maxims, the artiſts of moſt refined taſte were careful to avoid all deformity, chooſing rather to recede from truth than from their accuſtomed reſpect for beauty, as may be ſeen in ſeveral figures of Hecuba. Sometimes, however, ſhe appears in the decrepitude of age, her face furrowed with wrinkles, and her breaſts hanging down.

45 In the ſtatues of the Roman emperors. Illuſtrious men, and thoſe inveſted with the offices of dignity, are repreſented with a noble aſſurance and firm aſpect. The ſtatues of the Roman emperors reſemble thoſe of heroes, and are far removed from every ſpecies of flattery, in the geſture, in the attitude, and action. They never appear with haughty looks, or with the ſplendor of royalty; no figure is ever ſeen preſenting any thing to them with bended knee, except captives; and none addreſſes them with an inclination of the head.

In

In modern works too little attention has been paid to the ancient *coſtume*. Winkelman mentions a bas-relief, which was lately executed at Rome for the fountain of Trevi, repreſenting an architect in the act of preſenting the plan of an aqueduct to Marcus Agrippa. The modern ſculptor, not content with giving a long beard to that illuſtrious Roman, contrary to all the ancient marble ſtatues as well as medals which remain, exhibits the architect on his knees.

In general, it was an eſtabliſhed principle to baniſh all violent paſſions from public monuments. This will ſerve as a deciſive mark to diſtinguiſh the true antique from ſuppoſititious works. A medal has been found exhibiting two Aſſyrians, a man and woman tearing their hair, with this inſcription, ASSYRIA. ET. PALAESTINA. IN. POTEST. P. R. REDAC. S. C. The forgery of this medal is manifeſt from the word *Palaeſtina*, which is not to be found in any ancient Roman medal with a Latin inſcription. Beſides, the violent action of tearing the hair does not ſuit any ſymbolical figure. This extravagant ſtyle, which was called by the ancients *parenthyrſis*, has been imitated by moſt of the modern artiſts. Their figures reſemble comedians on the ancient theatres, who, in order to ſuit the diſtant ſpectators, put on painted maſks, employed exaggerated geſtures, and far overleaped the bounds of nature. This ſtyle has been reduced into a theory in a treatiſe on the paſſions compoſed by Le Brun. The deſigns which accompany that work exhibit the paſſions in the very higheſt degree, approaching even to frenzy: but theſe are calculated to vitiate the taſte, eſpecially of the young; for the ardour of youth prompts them rather to ſeize the extremity than the middle; and it will be difficult for that artiſt who has formed his taſte from ſuch empaſſioned models ever to acquire that noble ſimplicity and ſedate grandeur which diſtinguiſhed the works of ancient taſte.

46 Of proportions.

PROPORTION is the baſis of beauty, and there can be no beauty without it; on the contrary, proportion may exiſt where there is little beauty. Experience every day teaches us that knowledge is diſtinct from taſte; and proportion, therefore, which is founded on knowledge, may be ſtrictly obſerved in any figure, and yet the figure have no pretenſions to beauty. The ancients conſidering ideal beauty as the moſt perfect, have frequently employed it in preference to the beauty of nature.

The body conſiſts of three parts as well as the members. The three parts of the body are the trunk, the thighs, and the legs. The inferior parts of the body are the thighs, the legs, and the feet. The arms alſo conſiſt of three parts. Theſe three parts muſt bear a certain proportion to the whole as well as to one another. In a well formed man the head and body muſt be proportioned to the thighs, the legs, and the feet, in the ſame manner as the thighs are proportioned to the legs and the feet, or the arms to the hands. The face alſo conſiſts of three parts, that is, three times the length of the noſe; but the head is not four times the length of the noſe, as ſome writers have aſſerted. From the place where the hair begins to the crown of the head are only three-fourths of the length of the noſe, or that part is to the noſe as 9 to 12.

It is probable that the Grecian, as well as Egyptian artiſts, have determined the great and ſmall proportions by fixed rules; that they have eſtabliſhed a poſitive meaſure for the dimenſions of length, breadth, and circumference. This ſuppoſition alone can enable us to account for the great conformity which we meet with in ancient ſtatues. Winkelman thinks that the foot was the meaſure which the ancients uſed in all their great dimenſions, and that it was by the length of it that they regulated the meaſure of their figures, by giving to them ſix times that length. This in fact is the length which Vitruvius aſſigns, *Pes vero altitudinis corporis ſextæ*, lib. iii. cap. 1. That celebrated antiquary thinks the foot is a more determinate meaſure than the head or the face, the parts from which modern painters and ſculptors too often take their proportions. This proportion of the foot to the body, which has appeared ſtrange and incomprehenſible to the learned Huetius, and has been entirely rejected by Perrault, is however founded upon experience. After meaſuring with great care a vaſt number of figures, Winkelman found this proportion obſerved not only in Egyptian ſtatues, but alſo in thoſe of Greece. This fact may be determined by an inſpection of thoſe ſtatues the feet of which are perfect. One may be fully convinced of it by examining ſome divine figures, in which the artiſts have made ſome parts beyond their natural dimenſions. In the Apollo Belvidere, which is a little more than ſeven heads high, the foot is three Roman inches longer than the head. The head of the Venus de Medicis is very ſmall, and the height of the ſtatue is ſeven heads and a half: the foot is three inches and a half longer than the head, or preciſely the ſixth part of the length of the whole ſtatue.

PRACTICE OF SCULPTURE.

47 Grecian ſculpture to be ſtudied by the modern artiſts.

WE have been thus minute in our account of the Grecian ſculpture, becauſe it is the opinion of the ableſt critics that modern artiſts have been more or leſs eminent as they have ſtudied with the greater or leſs attention the models left us by that ingenious people: Winkelman goes ſo far as to contend that the moſt finiſhed works of the Grecian maſters ought to be ſtudied in preference even to the works of nature. This appears to be paradoxical; but the reaſon aſſigned by the Abbé for his opinion is, that the faireſt lines of beauty are more eaſily diſcovered, and make a more ſtriking and powerful impreſſion, by their reunion in theſe ſublime copies, than when they are ſcattered far and wide in the original. Allowing, therefore, the ſtudy of nature the high degree of merit it ſo juſtly claims, it muſt nevertheleſs be granted, that it leads to true beauty by a much more tedious, laborious, and difficult path, than the ſtudy of the *antique*, which preſents immediately to the artiſt's view the object of his reſearches, and combines in a clear and ſtrong point of light the various rays of beauty that are diſperſed through the wide domain of nature.

As ſoon as the artiſt has laid this excellent foundation, acquired an intimate degree of familiarity with the beauties of the Grecian ſtatues, and formed his taſte after the admirable models they exhibit, he may then proceed with advantage and aſſurance to the imitation of nature. The ideas he has already formed of the perfection of nature, by obſerving her diſperſed beauties combined and collected in the compoſitions of the ancient

artiſts, will enable him to acquire with facility, and to employ with advantage, the detached and partial ideas of beauty which will be exhibited to his view in a ſurvey of nature in her actual ſtate. When he diſcovers theſe partial beauties, he will be capable of combining them with thoſe perfect forms of beauty with which he is already acquainted. In a word, by having always preſent to his mind the noble models already mentioned, he will be in ſome meaſure his own oracle, and will draw rules from his own mind.

48 Two ways of imitating nature.

There are, however, two ways of imitating nature. In the one a ſingle object occupies the artiſt, who endeavours to repreſent it with preciſion and truth; in the other, certain lines and features are taken from a variety of objects, and combined and blended into one regular whole. All kinds of copies belong to the firſt kind of imitation; and productions of this kind muſt be executed neceſſarily in the Dutch manner, that is to ſay, with high finiſhing, and little or no invention. But the ſecond kind of imitation leads directly to the inveſtigation and diſcovery of true beauty, of that beauty whoſe idea is connate with the human mind, and is only to be found there in its higheſt perfection. This is the kind of imitation in which the Greeks excelled, and in which men of genius excite the young artiſts to excell after their example, *viz.* by ſtudying nature as they did.

After having ſtudied in the productions of the Grecian maſters their choice and expreſſion of ſelect nature, their ſublime and graceful contours, their noble draperies, together with that ſedate grandeur and admirable ſimplicity that conſtitute their chief merit, the curious artiſts will do well to ſtudy the manual and mechanical part of their operations, as this is abſolutely neceſſary to the ſucceſsful imitation of their excellent manner.

49 Models of ſtatues.

It is certain that the ancients almoſt always formed their firſt models in wax: to this modern artiſts have ſubſtituted clay, or ſome ſuch compoſition: they prefer clay before wax in the carnations, on account of the yielding nature of the latter, and its ſticking in ſome meaſure to every thing it touches. We muſt not, however, imagine from hence that the method of forming models of wet clay was either unknown or neglected among the Greeks; on the contrary, it was in Greece that models of this kind were invented. Their author was Dibutades of Sicyon; and it is well known that Arceſilas, the friend of Lucullus, obtained a higher degree of reputation by his clay models than by all his other productions. Indeed, if clay could be made to preſerve its original moiſture, it would undoubtedly be the fitteſt ſubſtance for the models of the ſculptor; but when it is placed either in the fire or left to dry imperceptibly in the air, its ſolid parts grow more compact, and the figure loſing thus a part of its dimenſions, is neceſſarily reduced to a ſmaller volume. This diminution would be of no conſequence did it equally affect the whole figure, ſo as to preſerve its proportions entire. But this is not the caſe: for the ſmaller parts of the figure dry ſooner than the larger; and thus loſing more of their dimenſions in the ſame ſpace of time than the latter do, the ſymmetry and proportions of the figure inevitably ſuffer. This inconveniency does not take place in thoſe models that are made in wax. It is indeed extremely difficult, in the ordinary method of working the wax, to give it that degree of ſmoothneſs that is neceſſary to repreſent the ſoftneſs of the carnations or fleſhy parts of the body. This inconvenience may, however, be remedied, by forming the model firſt in clay, then moulding it in plaſter, and laſtly caſting it in wax. And, indeed, clay is ſeldom uſed but as a mould in which to caſt a figure of plaſter, ſtucco, or wax, to ſerve henceforth for a model by which the meaſures and proportions of the ſtatue are to be adjuſted. In making waxen models, it is common to put half a pound of colophony to a pound of wax; and ſome add turpentine, melting the whole with oil of olives.

50 Method of working the marble, and

So much for the firſt or preparatory ſteps in this procedure. It remains to conſider the manner of working the marble after the model ſo prepared; and the method here followed by the Greeks ſeems to have been extremely different from that which is generally obſerved by modern artiſts. In the ancient ſtatues we find the moſt ſtriking proofs of the freedom and boldneſs that accompanied each ſtroke of the chiſel, and which reſulted from the artiſt's being perfectly ſure of the accuracy of his idea, and the preciſion and ſteadineſs of his hand: the moſt minute parts of the figure carry theſe marks of aſſurance and freedom; no indication of timorouſneſs or diffidence appears; nothing that can induce us to fancy that the artiſt had occaſion to correct any of his ſtrokes. It is difficult to find, even in the ſecond-rate productions of the Grecian artiſts, any mark of a falſe ſtroke or a random touch. This firmneſs and preciſion of the Grecian chiſel were certainly derived from a more determined and perfect ſet of rules than thoſe which are obſerved in modern times.

The method generally obſerved by the modern ſculptor is as follows: Firſt, out of a great block of marble he ſaws another of the ſize required, which is performed with a ſmooth ſteel ſaw, without teeth, caſting water and ſand thereon from time to time; then he faſhions it, by taking off what is ſuperfluous with a ſteel point and a heavy hammer of ſoft iron; after this, bringing it near the meaſure required, he reduces it ſtill nearer with another finer point; he then uſes a flat cutting inſtrument, having notches in its edge; and then a chiſel to take off the ſcratches which the former has left; till, at length, taking raſps of different degrees of fineneſs, by degrees he brings his work into a condition for poliſhing.

After this, having ſtudied his model with all poſſible attention, he draws upon this model horizontal and perpendicular lines which interſect each other at right angles. He afterwards copies theſe lines upon his marble, as the painter makes uſe of ſuch tranſverſal lines to copy a picture, or to reduce it to a ſmaller ſize. Theſe tranſverſal lines or ſquares, drawn in an equal number upon the marble and upon the model, in a manner proportioned to their reſpective dimenſions, exhibit accurate meaſures of the ſurfaces upon which the artiſt is to work; but cannot determine, with equal preciſion, the depths that are proportioned to theſe ſurfaces.—The ſculptor, indeed, may determine theſe depths by obſerving the relation they bear to his model; but as his eye is the only guide he has to follow in this eſtimate, he is always more or leſs expoſed to error, or at leaſt to doubt. He is never ſure that the cavities made

by

by his chiſel are exact; a degree of uncertainty accompanies each ſtroke; nor can he be aſſured that it has carried away neither too much nor too little of his marble. It is equally difficult to determine, by ſuch lines as have already been mentioned, the external and internal contours of the figure, or to transfer them from the model to the marble. By the internal contour is underſtood that which is deſcribed by the parts which approach towards the centre, and which are not marked in a ſtriking manner.

It is farther to be noticed, that in a complicated and laborious work, which an artiſt cannot execute without aſſiſtance, he is often obliged to make uſe of foreign hands, that have not the talents or dexterity that are neceſſary to finiſh his plan. A ſingle ſtroke of the chiſel that goes too deep is a defect not to be repaired; and ſuch a ſtroke may eaſily happen, where the depths are ſo imperfectly determined. Defects of this kind are inevitable, if the ſculptor, in chipping his marble, begins by forming the depths that are requiſite in the figure he deſigns to repreſent. Nothing is more liable to error than this manner of proceeding. The cautious artiſt ought, on the contrary, to form theſe depths gradually, by little and little, with the utmoſt circumſpection and care; and the determining of them with preciſion ought to be conſidered as the laſt part of his work, and as the finiſhing touches of his chiſel.

51 of copying ancient ſtatues.

The various inconveniences attending this method determined ſeveral eminent artiſts to look out for one that would be liable to leſs uncertainty, and productive of fewer errors. The French academy of painting at Rome hit on a method of copying the ancient ſtatues, which ſome ſculptors have employed with ſucceſs, even in the figures which they finiſhed after models in clay or wax. This method is as follows. The ſtatue that is to be copied is incloſed in a frame that fits it exactly. The upper part of this frame is divided into a certain number of equal parts, and to each of theſe parts a thread is fixed with a piece of lead at the end of it. Theſe threads, which hang freely, ſhow what parts of the ſtatue are moſt removed from the centre with much more perſpicuity and preciſion than the lines which are drawn on its ſurface, and which paſs equally over the higher and hollow parts of the block: they alſo give the artiſt a tolerable rule to meaſure the more ſtriking variations of height and depth, and thus render him more bold and determined in the execution of his plan.

But even this method is not without its defects: for as it is impoſſible, by the means of a ſtraight line, to determine with preciſion the procedure of a curve, the artiſt has, in this method, no certain rule to guide him in his contours; and as often as the line which he is to deſcribe deviates from the direction of the plumb line, which is his main guide, he muſt neceſſarily feel himſelf at a loſs, and be obliged to have recourſe to conjecture.

It is alſo evident, that this method affords no certain rule to determine exactly the proportion which the various parts of the figure ought to bear to each other, conſidered in their mutual relation and connections. The artiſt, indeed, endeavours to ſupply this defect by interſecting the plumb-lines by horizontal ones. This recourſe has, nevertheleſs, its inconveniences, ſince the ſquares formed by tranſverſal lines, that are at a diſtance from the figure (though they be exactly equal), yet repreſent the parts of the figure as greater or ſmaller, according as they are more or leſs removed from our poſition or point of view. But, notwithſtanding theſe inconveniences, the method now under conſideration is certainly the beſt that has hitherto been employed: it is more practicable and ſure than any other we know, though it appears, from the remarks we have now been making, that it does not exhibit a ſure and univerſal criterion to a ſculptor who executes after a model.

52 Of poliſhing the ſtatue.

To poliſh the ſtatue, or make the parts of it ſmooth and ſleek, pumice-ſtone and ſmelt are uſed; then tripoli; and when a ſtill greater luſtre is required, burnt ſtraw is employed. For the *Caſting of Statues*, ſee FOUNDERY, and *PLASTER of Paris*.

SCU

Scum, Scurvy.

SCUM, properly denotes the impurities which a liquor, by boiling, caſts up to the ſurface. The term *ſcum* is alſo uſed for what is more properly called the ſcoria of metals.

SCUPPERS, in a ſhip, are certain channels cut through the water-ways and ſides of a ſhip, at proper diſtances, and lined with plated lead, in order to carry the water off from the deck into the ſea. The ſcuppers of the lower deck of a ſhip of war are uſually furniſhed with a leathern pipe, called the *ſcupper-hoſe*, which hangs downward from the mouth or opening of the ſcupper. The intent of this is to prevent the water from entering when the ſhip inclines under a weight of ſail.

SCURVY, in *Medicine*, ſee that article, N° 351, where we have given an account of the ſymptoms, cauſes, and modes of prevention and cure, according to ſome of the moſt eminent writers in medicine. We have here only to add, that, in the opinion of Dr Beddoes, the mineral acids, eſpecially the nitric and vitriolic, may be employed in the prevention or cure of this dreadful diſeaſe with as much ſucceſs as the vegetable acids.—But of all the ſubſtances that can at once be cheaply procured and long preſerved, he thinks the concrete acid of tartar by far the moſt promiſing. It is very grateful, and comes near to the citric acid. In tropical countries the ſcurvy is ſeldom known.

Scurvy ‖ Scute.

SCURVY-Graſs. See COCHLEAREA, BOTANY *Index*.

SCUTAGE (*ſcutagium*, Sax. *ſcildpening*), was a tax or contribution raiſed by thoſe that held lands by knights ſervice, towards furniſhing the king's army, at one, two, or three merks for every knight's fee. Henry III. for his voyage to the Holy Land, had a tenth granted by the clergy, and *ſcutage*, three merks of every knight's fee by the *laity*. This was alſo levied by Henry II. Richard I. and King John. See *KNIGHT-Service*.

SCUTE (*ſcutum*), a French gold coin of 3s. 4d. in the reign of King Henry V. Catharine queen of England had an aſſurance made her of ſundry caſtles, manors, lands, &c. valued at the ſum of 40,000 *ſcutes*, every

Scutellaria || Scytala

every two whereof were worth a noble. *Rot. Parl.* 1. *Hen.* VI.

SCUTELLARIA, SKULL-CAP, a genus of plants, belonging to the didynamia claſs; and in the natural method ranking under the 40th order, *Perſonatæ*. See BOTANY *Index*.

SCUTTLES, in a ſhip, ſquare holes cut in the deck, big enough to let down the body of a man, and which ſerve upon ſome occaſions to let the people down into any room below, or from one deck to another.

SCYLAX, a celebrated mathematician and geographer of Caria, flouriſhed under the reign of Darius Hyſtaſpes, about 558 B. C. Some have attributed to him the invention of geographical tables. We have under his name a geographical work publiſhed by Hoeſchelius; but it is written by a much later author, and is perhaps only an abridgement of Scylax's Ancient Geography.

SCYLLA, in *Ancient Geography*, a rock in the Fretum Siculum, near the coaſt of Italy, dangerous to ſhipping, oppoſite to Charybdis, a whirlpool on the coaſt of Sicily; both of them famous in mythology.

Sutherland's Tour up the Straits, Letter xii.

Scylla and Charybdis have been almoſt ſubdued by the repeated convulſions of this part of the earth, and by the violence of the current, which is continually increaſing the breadth of the ſtraits. If proper allowance be made for theſe circumſtances, we ſhall acquit the ancients of any exaggeration, notwithſtanding the very dreadful colours in which they have painted this paſſage. It is formed by a low peninſula, called *Cape Pelorus*, ſtretching to the eaſtward on the Sicilian ſide, immediately within which lies the famous whirlpool of Charybdis, and by the rocks of Scylla, which a few miles below on the Calabrian ſhore project towards the weſt. The current runs with ſurpriſing force from one to the other alternately in the direction of the tide, and the tides themſelves are very irregular. Thus veſſels, by ſhunning the one, were in the utmoſt danger of being ſwallowed up by the other.

At preſent, in moderate weather, when the tide is either at ebb or flood, boats paſs all over the whirlpool: but, in general, it is like the meeting of two contending currents, with a number of eddies all around; and, even now, there is ſcarcely a winter in which there are not ſome wrecks.

"At the time when we paſſed the ſtraits (ſays Captain Sutherland, from whom we have obtained this accurate information) the weather was as favourable as we could wiſh; and yet, in ſpite of a ſtrong breeze and the current, which hurried us on with ſurpriſing velocity, the ſhip's head was ſuddenly whirled round near three points; but the wind blowing freſh, in a few ſeconds ſhe daſhed through the eddy that had caught her; for, to avoid Scylla, and ſecure Meſſina, we had kept pretty cloſe to Charybdis." For a later account of theſe rocks, ſee SICILY.

SCYROS, an iſland in the Ægean ſea, at the diſtance of about 28 miles north-eaſt from Eubœa. It is 60 miles in circumference. It was originally in the poſſeſſion of the Pelaſgians and Carians. Achilles retired there to avoid going to the Trojan war, and became father of Neoptolemus by Deidamia the daughter of King Lycomedes. Scyros was conquered by the Athenians under Cimon. It was very rocky and barren. Now *Sciro*. E. Long. 25. 0. N. Lat. 38. 15.

SCYTALA LACONICA, in antiquity, a ſtratagem or device of the Lacedemonians, for the ſecret writing of letters to their correſpondents, ſo that if they ſhould chance to be intercepted, nobody might be able to read them.—To this end they had two wooden rollers or cylinders, perfectly alike and equal; one whereof was kept in the city, the other by the perſon to whom the letter was directed. For the letter, a ſkin of very thin parchment was wrapped round the roller, and thereon was the matter written; which done, it was taken off, and ſent away to the party, who, upon putting it in the ſame manner upon his roller, found the lines and words in the very ſame diſpoſition as when they were firſt written. This expedient they ſet a very high value on; though, in truth, artleſs and groſs enough: the moderns have improved vaſtly on this method of writing. See CIPHER.

Scytala, Scythe.

SCYTALIA, a genus of plants belonging to the octandria claſs; and in the natural method ranking with thoſe that are doubtful. See BOTANY *Index*.

SCYTHE, in *Huſbandry*, a well known inſtrument which has been long employed for cutting graſs for hay. The ſame inſtrument with certain modifications in its conſtruction has been uſed in reaping grain, in place of the ſickle the uſe of which is far more common, and in Scotland at leaſt prevails almoſt univerſally, although it muſt be admitted that the method of reaping by the ſcythe, where it is practicable, is attended with leſs labour, is more expeditious, and therefore more economical. But againſt the uſe of the ſcythe, as a reaping inſtrument, many objections have been raiſed. Some of theſe are probably founded in prejudice, while others, conſidering the ſlow progreſs which has been made in introducing this inſtrument as a ſubſtitute for the ſickle, reſt on a more ſolid foundation.

It is ſaid that this inſtrument ſhakes the ear, ſo that many of the grains are loſt; that it lets the corn fall after it is cut, in a ſcattered confuſed manner, in conſequence of which either a great deal of it is loſt, or much time is waſted in gathering it together. It is alſo affirmed that it can only be made uſe of in very even land, and which is free from ſtones; that it does not leave length enough of ſtubble on the ground, on which to lay the corn when it is cut; that it mixes noxious weeds with the corn, the ſeeds of which are ſown the enſuing year; and finally, that the uſe of the ſcythe is prejudicial to the health of the reaper.

It appears, however, that theſe objections have either no weight, or they are made by thoſe who are unacquainted with the ſcythes peculiarly adapted to this purpoſe, and with the manner in which they ought to be uſed. With a good ſcythe properly managed, the corn when cut, remains at firſt upright, afterwards falling gently on the rake fixed to the ſcythe, without any ſhaking or jolting, or at leaſt with leſs than what is occaſioned by the ſickle. The loſs of grain chiefly ariſes from the corn being too dry, and therefore it ought to be reaped on proper days, and ſuitable times of the day, which is more eaſily accompliſhed by the ſcythe than the ſickle, becauſe the one requires leſs time than the other. The ſtalks, held together by the rake, may be laid on the ground, or againſt the corn not yet cut down, in a ſtate ſo regular and connected, that thoſe by whom the ſheaves are collected and bound have themſelves alone to blame, ſhould any thing be left behind. It is ſufficiently even when lands are ploughed and harrowed

Scythe. rowed in a proper manner; and the only neceſſary precaution in ſtony ground, is to keep the ſcythe a little higher, that it may not ſtrike againſt the ſtones. If the ſtubble be ſhort, the ſtraw cut off will of courſe be the longer, and of conſequence more valuable; and long ſtubble only incommodes the cattle afterwards ſent to feed upon it.

Theſe and ſimilar conſiderations, prevailed with the patriotic ſociety of Milan, to ſend to theſe places where ſcythes are uſed for reaping; and having procured a model from Sileſia, they ordered one of a proper ſize to be made. It was firſt tried on corn, and afterwards on millet; and notwithſtanding the firſt was far from being made with accuracy, and although ſuch an inſtrument had never before been made uſe of by the reaper, nearly half the uſual time was found to be ſaved, and the wonted fatigue and labour were much diminiſhed. The corn was cut without receiving any injurious ſhock, falling in an even and regular ſtate, by which means it was afterwards bound up with eaſe in compact ſheaves.

Plate cccclxxviii. Fig. 1. Theſe inſtruments are ſo ſimple in their conſtruction, that a figure of one of them renders a deſcription almoſt unneceſſary. Fig. 1. repreſents the Sileſian ſcythe tried by the ſociety, the difference between which and the Auſtrian one we ſhall mention in our deſcription. The Sileſian ſcythe differs little from that commonly employed in mowing graſs, except that the blade is rather ſmaller; to it four teeth of wood are added, parallel to the blade, fixed and ſecured in a proper manner, and deſigned to keep the corn together after it is cut; ſo that inſtead of its falling in a confuſed ſtate, the reaper can lay it down in a regular and compact manner. The Auſtrian ſcythe is ſimilar to the former, but the blade is larger; of courſe the wooden teeth, being five in number, are longer; the handle is alſo flatter, and rather crooked.

In the firſt, the handle *a b* (ſee fig. 1.) is four feet three inches in length; the blade *b c* is about two feet; the piece of wood in which the teeth are fixed, one foot ten inches and a half. In the *ſecond*, the handle is four feet one inch; the blade, two feet eight inches; the piece in which the teeth are fixed, $11\frac{1}{4}$ inches.

The difference in the conſtruction of theſe two ſcythes renders it neceſſary to uſe them in a different manner, which will be better acquired in practice than by precept. Such as are accuſtomed to the uſe of the common ſcythe will ſoon find out the moſt advantageous manner of uſing theſe new kinds of ſcythes, and of laying down the corn properly after it is cut.

It is neceſſary to obſerve, that, in mowing graſs, the feet are held in a poſition nearly parallel to each other, whereas in reaping corn they ſhould be kept on a line, the one behind the other, bringing the right foot forward, and drawing the left towards it. The reaſon is, that when graſs is mowed it is left to fall where it is cut; but when corn is cut down, it is to be laid in a proper manner againſt that which is not yet cut, and which is at the reaper's left hand. Were the feet kept parallel to each other, the reaper would be under the neceſſity of extending and turning his body in a very inconvenient manner.

Theſe obſervations having been publiſhed, the ſociety made farther experiments on the ſubject, by which they diſcovered, that when the ſtalks of corn are bent down by reaſon of extremely wet weather, the wooden teeth of the ſcythes are apt to lay hold of ſome ears, to the ſtalks of which the iron does not extend; and therefore theſe not being cut below, are pulled ſo that the grain is ſcattered. This chiefly happens from the reapers not being accuſtomed to that kind of ſcythe, and therefore not knowing how to adapt it to particular exiſting circumſtances. Scythe, Scythia.

It occurred to an ingenious blackſmith, that, in order to remedy this inconvenience, a *collector* made of cloth ſhould be added to the common ſcythe, as may be ſeen at fig. 2. where *a b c* is a common ſcythe, *c d m l o f n e* is the gatherer, which at *c d e* is compoſed of a thin plate of iron, having a hollow at its extremity for receiving the point of the blade. At *e d* are holes for ſewing in the cloth, which is coarſe, light, and of low price; it is alſo fixed to two thick iron wires, of which the upper one is continued to *f*, where it terminates in a hole in the handle; the other is fixed to the back of the blade. The manner of fixing this gatherer to the back of the ſcythe will be better underſtood by referring to fig. 3. which repreſents one of the irons which, by means of the ſcrew, are faſtened to the back of the ſcythe. Theſe proceed from, and make part of the upright irons *m n*, *l o*, which ſerve to keep the gatherer extended. Fig. 2. Fig. 3.

This contrivance is both cheap and ſimple; but an attempt was made to render it more ſo, by ſubſtituting two iron hoops for the gatherer, which are ſhewn in fig. 2. by the dotted lines *h g*, *k i*, with a croſs piece *p*, which connects them. Experience has ſhewn, however, that the gatherer is in general preferable to theſe hoops, as it does not leave an ear of corn behind. Fig. 2.

SCYTHIA, an ancient name for the northern parts of Aſia, now known by the name of *Tartary*; alſo for ſome of the north-eaſtern parts of Europe.

This vaſt territory, which extends itſelf from the Iſter or Danube, the boundary of the Celts, that is, from about the 25th to almoſt the 110th degree of eaſt longitude, was divided into Scythia in Europe and Scythia in Aſia, including, however, the two Sarmatias; or, as they are called by the Greeks, *Sauromatias*, now the Circaſſian Tartary, which lay between and ſevered the two Scythias from each other. Sauromatia was alſo diſtinguiſhed into European and Aſiatic; and was divided from the European Scythia by the river Don or Tanais, which falls into the Palus Meotis; and from the Aſiatic by the Rha, now Volga, which empties itſelf into the Caſpian ſea.

1. The Aſiatic Scythia comprehended, in general, great Tartary, and Ruſſia in Aſia; and, in particular, the Scythia beyond or without Imaus, contained the regions of Bogdoi or Oſtiacci, and Tanguti. That within, or on this ſide Imaus, had Turkeſtan and Mongal, the Uſbeck or Zagatai, Kalmuc and Nagaian Tartars; beſides Siberia, the land of the Samoiedes, and Nova Zembla. Theſe three laſt not being ſo ſoon inhabited as the former, as may be reaſonably ſuppoſed, were wholly unknown to the ancients; and the former were peopled by the Bactrians, Sogdians, Gandari, Sacks, and Maſſagetes. As for Sarmatia, it contained Albania, Iberia, and Colchis; which makes now the Circaſſian Tartary, and the province of Georgia.

2. Scythia in Europe reached (towards the ſouth-weſt) to the Po and the Alps, by which it was divided from Celto-Gallia. It was bounded on the ſouth by the

Scythia ‖ Sea.

the Iſter or Danube and the Euxine ſea. Its northern limits have been ſuppoſed to ſtretch to the ſpring-heads of the Boriſthenes or Nieper, and the Rha or Volga, and ſo to that of the Tanais.—The ancients divided this country into Scythia Arimaſpæa, which lay eaſtward, joining to Scythia in Aſia; and Sarmatia Europeana on the weſt. In Scythia, properly ſo called, were the Arimaſpæi on the north; the Getæ or Dacians along the Danube, on the ſouth; and the Neuri between theſe two. So that it contained the European Ruſſia or Muſcovy, and the Leſſer Crim Tartary eaſtward; and, on the weſt, Lithuania, Poland, part of Hungary, Tranſilvania, Walachia, Bulgaria, and Moldavia. Sarmatia is ſuppoſed to have reached northward to that part of Swedeland called *Feningia*, now *Finland;* in which they placed the Oœnes, Panoti, and Hippopodes. This part they divided from Northern Germany, now the weſt part of Sweden and Norway, by the *Mare Sarmaticum* or *Scythicum*, which they ſuppoſed ran up into the northern ocean, and, dividing Lapland into two parts, formed the weſtern part of Sweden, with Norway, into one iſland, and Finland into another; ſuppoſing this alſo to be cut off from the continent by the gulf of that name.

Although the ancient Scythians were celebrated as a warlike people, yet their hiſtory is too uncertain and obſcure to enable us to give any detail which would not prove equally tireſome and unintereſting to the reader. Mr Pinkerton, in a diſſertation on their origin, endeavours to prove that they were the moſt ancient of nations; and he aſſigns for the place of their firſt habitation the country known by the name of Perſia. From Perſia, he thinks, they proceeded in numerous hordes weſtward, ſurrounded the Euxine, peopled Germany, Italy, Gaul, the countries bordering on the Baltic, with part of Britain and Ireland. That the Scythians were of Aſiatic origin cannot, we think, be queſtioned; and as Perſia was peopled at a very early period, it may not improbably have been their parent country: but when our author contends that their empire had ſubſiſted for more than 1500 years before Ninus the founder of the Aſſyrian monarchy, and that it extended from Egypt to the Ganges, and from the Perſian gulf and Indian ſea to the Caſpian, we cannot help thinking that his prejudices againſt the Celts, and his deſire to do honour to his favourite Goths, have made him advance a paradox inconſiſtent with the moſt authentic records of antiquity. His diſſertation however is ingenious, and replete with a variety of curious learning.

SCYTHIAN Lamb, in *Natural Hiſtory*. See *Scythian* LAMB.

SCYTHROPS or CHANNEL-BILL, a genus of birds belonging to the order of Picæ. See ORNITHOLOGY, N° 149.

SEA, in a ſtrict ſenſe, ſignifies a large portion of water almoſt ſurrounded by land, as the Baltic and Mediterranean ſeas; but it is frequently uſed for that vaſt body of water which encompaſſes the whole earth.

1 What proportion the ſurface of the ſea bears to that of the land.

What proportion the ſuperficies of the ſea bears to that of the land cannot eaſily be aſcertained. Buffon has ſuppoſed that the ſurface of our globe is equally divided between land and water, and has accordingly calculated the ſuperficies of the ſea to be 85,490,506 ſquare miles. But it is now well known that the ocean covers much more than the half of the earth's ſurface. Buffon believed the exiſtence of a vaſt ſouthern continent, which Captain Cook has ſhown to be viſionary. It was this circumſtance which miſled him. According to the moſt accurate obſervations hitherto made, the ſurface of the ſea is to the land as three to one; the ocean therefore extends over 128,235,759 ſquare miles, ſuppoſing the ſuperficies of the whole globe to be 170,981,012 ſquare miles. To aſcertain the depth of the ſea is ſtill more difficult than its ſuperficies, both on account of the numerous experiments which it would be neceſſary to make, and the want of proper inſtruments for that purpoſe. Beyond a certain depth the ſea has hitherto been found unfathomable; and though ſeveral methods have been contrived to obviate this difficulty, none of them has completely anſwered the purpoſe. We know in general that the depth of the ſea increaſes gradually as we leave the ſhore; but if this continued beyond a certain diſtance, the depth in the middle of the ocean would be prodigious. Indeed the numerous iſlands everywhere ſcattered in the ſea demonſtrate the contrary, by ſhowing us that the bottom of the water is unequal like the land, and that ſo far from uniformly ſinking, it ſometimes riſes into lofty mountains. If the depth of the ſea be in proportion to the elevation of the land, as has generally been ſuppoſed, its greateſt depth will not exceed five or ſix miles, for there is no mountain ſix miles perpendicular above the level of the ſea. The ſea has never been actually ſounded to a greater depth than a mile and 66 feet; every thing beyond that therefore reſts entirely upon conjecture and analogical reaſoning, which ought never to be admitted to determine a ſingle point that can be aſcertained by experiment, becauſe, when admitted, they have too often led to falſe concluſions. Along the coaſts, where the depth of the ſea is in general well known, it has always been found proportioned to the height of the ſhore: when the coaſt is high and mountainous, the ſea that waſhes it is deep; when, on the contrary, the coaſt is low, the water is ſhallow. Whether this analogy holds at a diſtance from the ſhore, experiments alone can determine.

Sea.

2 Depth of the ſea.

3 Quantity of water which it contains.

To calculate the quantity of water contained in the ſea, while its depth is unknown, is impoſſible. But if we ſuppoſe with Buffon that its medium depth is the fourth part of a mile, the ocean, if its ſuperficies be 120,235,759 ſquare miles, will contain 32,058,939·75 cubic miles of water.

Buffon's Theory of the Earth, art. 10.

Let us now endeavour to compute the quantity of water which is conſtantly diſcharged into the ſea. For this purpoſe let us take a river whoſe velocity and quantity of water is known, the Po, for inſtance, which according to Riccioli is 1000 feet (or 100 perches of Bologna) broad, 10 feet deep, and runs at the rate of four miles in an hour; conſequently that river diſcharges into the ſea 200,000 cubic perches of water in an hour, or 4,800,000 in a day. A cubic mile contains 125,000,000 cubic perches; the Po therefore will take 26 days to diſcharge a cubic mile of water into the ſea. Let us now ſuppoſe, what is perhaps not very far from the truth, that the quantity of water which the ſea receives from the rivers in any country is proportioned to the extent of that country. The Po from its origin to its mouth traverſes a country 380 miles long, and the rivers which fall into it on every ſide riſe from ſources about ſixty miles diſtant from it.

The

Sea. The Po, therefore, and the rivers which it receives, water a country of 45,600 ſquare miles. Now ſince the whole ſuperficies of the dry land is about 42,745,253 ſquare miles, it follows, from our ſuppoſition, that the quantity of water diſcharged by all the rivers in the world, in one day, is 36 cubic miles, and in a year 13,140. If therefore the ſea contains 32,058,939 cubic miles of water, it would take all the rivers in the world 2439 years to diſcharge an equal quantity.

4 Why it does not increaſe. It may ſeem ſurpriſing that the ſea, ſince it is continually receiving ſuch an immenſe ſupply of water, does not viſibly increaſe, and at laſt cover the whole earth. But our ſurpriſe will ceaſe, if we conſider that the rivers themſelves are ſupplied from the ſea, and that they do nothing more than carry back thoſe waters which the ocean is continually laviſhing on the earth. Dr Halley has demonſtrated that the vapours raiſed from the ſea and tranſported on land are ſufficient to maintain all the rivers in the world. The ſimplicity of this great proceſs is aſtoniſhing: the ſea not only connects diſtant countries, and renders it eaſy to tranſport the commodities of one nation to another, but its waters riſing in the air deſcend in ſhowers to fertilize the earth and nouriſh the vegetable kingdom, and collecting into rivers flow onwards, bringing fertility and wealth and commerce along with them, and again return to the ſea to repeat the ſame round.

5 Theories of philoſophers on this ſubject. The knowledge of this proceſs of nature might, one would think, have convinced philoſophers that the proportion between ſea and land continued always nearly the ſame. Philoſophers however have formed different theories about this as well as moſt other ſubjects, maintaining on the one hand that the ſea is continually encroaching on the land, and on the other that the land is conſtantly gaining on the ſea. Both ſides have ſupported their theories by arguments, demonſtrations, and incontrovertible facts!

6 Arguments of thoſe who affirm that the ſea is encroaching on the land. The height of the mountains, ſay the philoſophers who ſupport the encroachments of the ſea, is continually diminiſhing; expoſed to the violence of every ſtorm, the hardeſt rocks muſt at laſt give way and tumble down. The rivers are continually ſweeping along with them particles of earth which they depoſite in the bottom of the ſea. Both the depth of the ocean then and the height of the dry land muſt be always decreaſing; the waters therefore muſt, unleſs a part of them were annihilated, ſpread over a greater extent of ſurface in proportion as theſe cauſes operate. This reaſoning, convincing as it is, might be confirmed by a great number of facts: it will be ſufficient however to mention one or two. In the reign of Auguſtus the iſle of Wight made a part of Britain, ſo that the Engliſh croſſed over to it at low water with cart loads of tin; yet that iſland is at preſent ſeparated from Britain by a channel half a mile wide. The Godwin ſands on the eaſtern ſhore of England were formerly the fertile eſtate of earl Godwin. Nor are the encroachments of the ſea confined to Britain. In the bay of Baiæ near Naples there are remains of houſes and ſtreets ſtill viſible below the preſent level of the ſea. The ſea therefore is making continued encroachments upon the land; and the time will come, ſay they, when the waters will again cover the ſurface of the earth.

Such are the arguments of thoſe philoſophers who maintain the continual encroachments of the ſea. Thoſe who maintain the oppoſite theory, that the land is gradually gaining on the ſea, though they pretend not to deny the facts advanced by their opponents, affirm that they are altogether inſufficient to eſtabliſh the hypotheſis which they were brought forward to ſupport. Though the rivers carry down particles of earth into the ſea, theſe, ſay they, are either accumulated on other ſhores, or, collecting in the bottom of the ocean, harden into ſtone, which being poſſeſſed of a vegetative power riſes by degrees above the ſurface of the ſea and forms rocks, and mountains, and iſlands. The vegetative nature of ſtone indeed is ſufficient, of itſelf, to convince us that the quantity of earth muſt be daily accumulating, and conſequently that the ſurface of the ſea is diminiſhing in extent. Celſius, a Swediſh philoſopher (for this diſpute has been carried on in Sweden with the greateſt keenneſs), has endeavoured to build this theory with more ſolid materials than vegetable ſtone. In a curious memoir, publiſhed in 1743, he aſſerts that the Baltic and the Atlantic, at leaſt that part of it which waſhes Norway, is conſtantly diminiſhing; and he proves this by the teſtimony of a great many aged pilots and fiſhermen, who affirmed that the ſea was become much ſhallower in many places than it had been during their youth: that many rocks formerly covered with water were now ſeveral feet above the ſurface of the ſea: that loaded veſſels uſed formerly to ride in many places where pinnaces and barks could now with difficulty ſwim. He produces inſtances of ancient ſea-port towns now ſeveral leagues from the ſhore, and of anchors and wrecks of veſſels found far within the country. He mentions a particular rock which 168 years before was at the bottom of the ſea, but was then raiſed eight feet above its ſurface. In another place where the water 50 years before had reached to the knee there was then none. Several rocks, too, which during the infancy of ſome old pilots had been two feet under water, were then three feet above it. From all theſe obſervations M. Celſius concludes, that the water of the Baltic decreaſes in height 4½ lines in a year, 4 inches 5 lines in 18 years, 4 feet 5 inches in a hundred years, and in a thouſand years 45 feet. Conſcious, however, that theſe facts, how concluſive ſoever as far as relates to the Baltic, can never determine the general queſtion, M. Celſius advances another argument in ſupport of his theory. All that quantity of moiſture, ſays he, which is imbibed by plants is loſt to the general maſs of water, being converted into earth by the putrefaction of vegetables. This notion had been mentioned by Newton, and was adopted by Van Helmont: if granted, it follows as a conſequence that the earth is continually increaſing and the water diminiſhing in a very rapid degree.

Sea. 7 Arguments of thoſe who affirm that the land is gaining on the ſea.

8 Theſe arguments examined. Such are the arguments advanced in ſupport of both theories; for it is needleſs to mention a notion of Linnæus that the whole earth was formerly covered with water except a ſingle mountain. When fairly weighed, they amount to nothing more than this, that the ſea has encroached upon the land in ſome places, and retired in others; a concluſion which we are very willing to allow. What was advanced by thoſe philoſophers who maintain that the ſea is continually encroaching on the land, about the depth of the ſea conſtantly diminiſhing, muſt remain a mere aſſertion till they prove by experiments, either that this is really the caſe, or that nature has no way of reſtoring thoſe particles of

Sea. earth which are washed down by the rivers. Nor have they any good reason to affirm that the height of the mountains is decreasing. Can a single uncontrovertible instance be produced of this? Are the Alps or the Apennines, or Taurus, or Caucasus, less lofty now than they were a thousand years ago? We mean not to deny that the rain actually washes down particles of earth from the mountains, nor to affirm that the hardest rocks are able to resist continual storms, nor that many mountains have suffered, and continue to suffer daily, from a thousand accidents. But the effects produced by all these causes are so trifling as to be altogether imperceptible (A). Nature has assiduously guarded against such accidents; she has formed the mountains of the most durable materials; and where they are covered with earth, she has bound it together by a thick and firm matting of grass, and thus secured it from the rains; and should accident deprive it of this covering, she takes care immediately to supply the defect. Even should the earth be swept away together with its covering, nature has still such resources left as frequently restore things to their former state. Many kinds of moss, one would be tempted to think, have been created for this very purpose: they take root and flourish almost upon the bare rock, and furnish as they decay a sufficient bed for several of the hardy Alpine plants. These perish in their turn, and others succeed them. The roots of the plants bind fast the earth as it accumulates, more plants spring up and spread wider, till by degrees the whole surface is covered with a firm coat of grass.

9 Bottom of the sea.

As the sea covers so great a portion of the globe, we should, no doubt, by exploring its bottom, discover a vast number of interesting particulars. Unfortunately in the greater part of the ocean this has hitherto been impossible. Part, however, has been examined; and the discoveries which this examination has produced may enable us to form some idea at least of the whole. The bottom of the sea, as might have been conjectured indeed beforehand, bears a great resemblance to the surface of the dry land, being, like it, full of plains, rocks, caverns and mountains; some of which are abrupt and almost perpendicular, while others rise with a gentle declivity, and sometimes tower above the water and form islands. Neither do the materials differ which compose the bottom of the sea and the basis of the dry land. If we dig to a considerable depth in any part of the earth, we uniformly meet with rock; the same thing holds in the sea. The strata, too, are of the same kind, disposed in the same manner, and form indeed but one whole. The same kind of mineral and bituminous substances are also found interspersed with these strata; and it is to them probably that the sea is indebted for its bitter taste. Over these natural and original strata an artificial bed has pretty generally been formed, composed of different materials in different places. It consists frequently of muddy tartareous substances firmly cemented together, sometimes of shells or coral reduced to powder, and near the mouths of rivers it is generally composed of fine sand or gravel. The bottom of the sea resembles the land likewise in another particular: many fresh springs and even rivers rise out of it, which, displacing the salt water, render the lower part of the sea wherever they abound quite fresh. An instance of this kind occurs near Goa on the western coast of Indostan *, and another † in the Mediterranean sea not far from Marseilles. These facts occasioned a notion, which later experiments have exploded, that the sea beyond a certain depth was always fresh.

Sea.

* *Boyle de Fundo Maris.*

† *Marsigli Histoire Physique de la Mer*, partie 1.

Substances of a very beautiful appearance are frequently brought up by the sounding line from the bottom of the sea. The plummet is hollowed below, and this cavity filled with tallow, to which some of the substances adhere which form the bed of the ocean. These are generally sand, gravel, or mud; but they are sometimes of the brightest scarlet, vermilion, purple, and yellow; and sometimes, though less frequently, they are blue, green, or white. These colours are owing to a kind of jelly which envelopes the substances, and vanish entirely as soon as this jelly dries. At times, however, they assume the appearance of tartareous crusts, and are then so permanent, that they can be received into white wax melted and poured round them, and perhaps by proper care might be converted into valuable paints.

10 Colour of the sea.

Sea-water is really, as any one may convince himself by pouring it into a glass, as clear and transparent as river water. The various appearances therefore which it assumes are owing to accidental causes, and not to any change in the water itself. The depth, or the materials which compose the bottom of the sea, occasions it to assume different colours in different places. The Arabian gulf, for instance, is said to be red from the colour of the sands which form its bed. The appearance of the sea is affected too by the winds and the sun, while the clouds that pass over it communicate all their various and fleeting colours. When the sun shines it is green; when the sun gleams through a fog it is yellow; near the north pole it appears black; while in the torrid zone its colour is often brown. Sometimes the sea assumes a luminous appearance. See LIGHT, Vol. XII. page 2.

11 Saltness of the sea.

The sea contains the greatest quantity of salt in the torrid zone, where otherwise from the excessive heat it would be in danger of putrefaction: as we advance northward this quantity diminishes, till at the pole it nearly vanishes altogether. Under the line Lucas found that the sea contained a seventh part of solid contents, consisting chiefly of sea-salt. At Harwich he found it yielded $\frac{1}{25}$th of sea-salt. At Carlscroon in Sweden it contains $\frac{1}{10}$th part (B), and on the coast of Greenland a great deal less. This deficiency of salt near the poles probably contributes a good deal towards the prodigi-

ous

(A) M. Genssanne pretends that the Pyrenean mountains become an inch lower every ten years. But even according to his own calculation, it would require a million of years to level these mountains with the plain, though they continued to decrease at the same rate; and philosophers tell us that this rate is constantly diminishing!

(B) This gradual diminution of saltness from the equator to the pole is not, however, without particular exceptions. The Mediterranean sea contains $\frac{1}{27}$th of sea-salt, which is less than the German sea contains.

Sea. ous quantities of ice which are met with in theſe ſeas; for ſalt water requires a much greater degree of cold to freeze it than freſh water. It was this circumſtance, probably, together with its conſtant motion, which induced the ancients to believe that the ſea never froze. Even among the moderns it has been a generally received opinion, that ſea-ice is originally formed in rivers. Buffon has made the great quantities of ice with which the South ſea abounds an argument for the exiſtence of a continent near the Antarctic pole. But it is now well known that great quantities of ice are formed at a diſtance from land. Sea-ice is of two kinds; field ice, which extends along the ſhore, and is only two or three feet thick; and mountain ice, which abounds in the middle of the ocean. The ſize of theſe mountains is ſometimes prodigious. The ſea-ice is always freſh, and has been often of great uſe to navigators. The weight of ſea-water is to that of river-water as 73 to 70; that is, a cubic foot of ſea-water weighs 73lb. while the ſame quantity of river-water weighs only 70lb.; but this proportion varies in different places. It is worthy of our attention, too, that the water at the ſurface of the ſea contains leſs ſalt than near the bottom; the difference indeed is inconſiderable, but ſtill it is ſomething. The Compte de Marſigli found the ſame quantity of water, when taken from the bottom of the Mediterranean, to weigh one ounce three pennyweights 51 grains; whereas from the ſurface it weighed only one ounce three pennyweights 49 grains. He repeated the experiment frequently with nearly the ſame reſult.

12 Temperature of the ſea. The ſea, with reſpect to temperature, may be divided into two regions: The firſt begins at the ſurface of the water, and deſcends as far as the influence of the ſun's rays; the ſecond reaches from thence to the bottom of the ſea. In ſummer the lower region is conſiderably colder than the upper: but it is probable that during winter the very reverſe takes place; at leaſt the Compte de Marſigli found it ſo repeatedly in the Mediterranean. This naturally reſults from the ſituation of the water near the bottom of the ſea. Uninfluenced by the changes in the atmoſphere, it retains always nearly the ſame degree of temperature: and this is conſiderably above congelation; for the lower region of the ſea, at leaſt in the temperate parts of the world, was never known to freeze. Captain Ellis let down a ſea-gage (ſee GAGE) in latitude 25° 13′ north, and longitude 25° 12′ weſt, to take the degrees of temperature and ſaltneſs of the ſea at different depths. It deſcended 5346 feet, which is a mile and eleven fathoms. He found the ſea ſalter and colder in proportion to its depth till the gage had deſcended 3900 feet, when the mercury in the thermometer came up at 53; but the water never grew colder, though he let down the gage 2446 feet lower. At the ſurface the thermometer ſtood at 84.

Boyle de Temperie Regionum Submarinarum.

Phil. Tranſ. for 1571, p. 213.

13 The ſea has three motions. Motion occaſioned by the wind. The ſea has three kinds of motion: 1. The firſt is that undulation which is occaſioned by the wind. This motion is entirely confined to the ſurface; the bottom even during the moſt violent ſtorms remains perfectly calm. Mr Boyle has remarked, from the teſtimony of ſeveral divers, that the ſea is affected by the winds only to the depth of ſix feet. It would follow from this, that the height of the waves above the ſurface does not exceed ſix feet; and that this holds in the Mediterranean at leaſt, we are informed by the Compte de Marſigli, though he alſo ſometimes obſerved them, during a very violent tempeſt, riſe two feet higher. It is affirmed by Pliny, and ſeveral other ancient writers, that oil calms the waves of the ſea; and that divers were accuſtomed to carry ſome of it for that purpoſe in their mouths. This account was always conſidered by the moderns as a fable, and treated with ſuch contempt, that they did not even deign to put it to the teſt of experiment, till Dr Franklin accidentally diſcovered its truth. Happening in 1757 to be in the middle of a large fleet, he obſerved that the water round one or two veſſels was quite calm and ſmooth, while everywhere elſe it was very much agitated by the winds. He applied to the captain for an explanation of this phenomenon, who replied, that the cooks, he ſuppoſed, had thrown their greaſy water out at the ſcupper-holes, and by that means oiled the ſides of the veſſels in queſtion. This anſwer did not ſatisfy the Doctor at firſt; but recollecting what Pliny had ſaid on the ſubject, he reſolved at leaſt to make the experiment. He did ſo accordingly in 1762, and found that oil actually calmed the waves of the ſea. He repeated the experiment upon a pond at Clapham: the oil ſpread itſelf with great rapidity upon the ſurface, but did not produce the deſired effect, becauſe, having been thrown in upon the ſide oppoſite to the wind, it was immediately driven to the edge of the water. But upon throwing in a like quantity upon the other ſide of the lake, it calmed in an inſtant ſeveral yards of the ſurface; and gradually ſpreading, rendered all that part of the lake, to the extent of at leaſt half an acre, as ſmooth as glaſs. The curious effect produced by this liquid may be accounted for by the repulſion which exiſts between oil and water, and between oil and air, which prevents all immediate contact, all rubbing of the one upon the other.

Sea. ſtilled by oil. 14

15 Motion towards the weſt—Currents. 2. The ſecond kind of motion is that continual tendency which the whole water in the ſea has towards the weſt. It is greater near the equator than about the poles; and indeed cannot be ſaid to take place at all in the northern hemiſphere beyond the trophic. It begins on the weſt ſide of America, where it is moderate: hence that part of the ocean has been called *Pacific*. As the waters advance weſtward their motion is accelerated; ſo that, after having traverſed the globe, they ſtrike with great violence on the eaſtern ſhore of America. Being ſtopped by that continent, they turn northward, and run with conſiderable impetuoſity in the gulf of Mexico; from thence they proceed along the coaſt of North America, till they come to the ſouth ſide of the great bank at Newfoundland, when they turn off, and run down through the Weſtern Iſles. This current is called the *Gulf Stream*. It was firſt accurately deſcribed by Dr Franklin, who remarked alſo, that the water in it having been originally heated in the torrid zone, cools ſo gradually in its paſſage northward, that even the latitude might be found in any part of the ſtream by means of a thermometer.—This motion of the ſea weſtward has never been explained: it ſeems to have ſome connection with the trade-winds and the diurnal revolution of the earth on its axis.

16 Motion occaſioned by the tide. 3. The third and moſt remarkable motion of the ſea is the tide, which is a regular ſwell of the ocean once every 12 hours, owing, as Newton has demonſtrated, to the attraction of the moon. In the middle of the ſea the tide ſeldom riſes higher than one or two feet,

Sea. but on the coaſt it frequently reaches the height of 45 feet, and, in ſome places even more. The tide generally riſes higher in the evening than in the morning: on the coaſt of Britain this holds in winter, but in ſummer the morning tides are higheſt. In ſome ſeas it is ſaid that there are no tides. This cannot be owing to their being ſurrounded by land, becauſe there is a tide in the lakes of North America. For an explanation of theſe and other phenomena we refer to the article TIDE.

SEA-Air, that part of the atmoſphere which is above the ſea.

Sea-air has been found ſalubrious and remarkably beneficial in ſome diſtempers. This may be owing to its containing a greater portion of oxigenous gas or vital air, and being leſs impregnated with noxious vapours than the land. Dr Ingenhouſz made ſeveral experiments to aſcertain the ſalubrity of ſea-air. By mixing equal meaſures of common air and nitrous air, he found, that at Graveſend, they occupied about 104, or one meaſure and $\frac{4}{100}$ of a meaſure: whereas on ſea, about three miles from the mouth of the Thames, two meaſures of air (one of common and one of nitrous air) occupied from 0.91 to 0.94. He attempted a ſimilar experiment on the middle of the channel between the Engliſh coaſt and Oſtend; but the motion of the ſhip rendered it impracticable. He found that in rainy and windy weather the ſea-air contained a ſmaller quantity of vital air than when the weather was calm. On the ſea-ſhore at Oſtend it occupied from $94\frac{1}{2}$ to 97; at Bruges he found it at 105; and at Antwerp $109\frac{1}{2}$. Dr Ingenhouſz thus concludes his paper:

Phil. Tranſ. 1780, p. 354. It appears, from theſe experiments, that the air at ſea and cloſe to it is in general purer and fitter for animal life than the air on the land, though it ſeems to be ſubject to the ſame inconſtancy in its degree of purity with that of the land; ſo that we may now with more confidence ſend our patients, labouring under conſumptives diſorders, to the ſea, or at leaſt to places ſituated cloſe to the ſea, which have no marſhes in their neighbourhood. It ſeems alſo probable, that the air will be found in general much purer far from the land than near the ſhore, the former being never ſubject to be mixed with land air.

Dr Damman, an eminent phyſician and profeſſor royal of midwifery at Ghent, told Dr Ingenhouſz, that when he was formerly a practitioner at Oſtend, during ſeven years, he found the people there remarkably healthy; that nothing was rarer there than to ſee a patient labouring under a conſumption or aſthma, a malignant, putrid, or ſpotted fever; that the diſeaſe to which they are the moſt ſubject, is a regular intermittent fever in autumn, when ſudden tranſitions from hot to cold weather happen.

People are in general very healthy at Gibraltar, though there are very few trees near that place; which Dr Ingenhouſz thinks is owing to the purity of the air ariſing from the neighbourhood of the ſea.

Moſt ſmall iſlands are very healthy.

At Malta people are little ſubject to diſeaſes, and live to a very advanced age.

SEA-Anemony. See *ANIMAL-Flower*.

SEA-Bear. *SEA-Calf*. *SEA-Cow*. See PHOCA, See TRICHECUS, } MAMMALIA *Index*.

SEA-Crow, *Mire-Crow*, or *Pewit*. See LARUS, ORNITHOLOGY *Index*. Sea.

SEA, Dead. See ASPHALTITES.

SEA-Devil. See LOPHIUS, ICHTHYOLOGY *Index*.

SEA-Dragon, a monſter of a very ſingular nature. In the Gentleman's Magazine for the year 1749, we have the account of a ſea-dragon which was ſaid to be taken between Orford and Southwould, on the coaſt of Suffolk, and afterwards carried round the country as a curioſity by the fiſhermen who caught it.

"Its head and tail (ſays the writer) reſemble thoſe of an alligator; it has two large fins, which ſerve it both to ſwim and to fly; and though they were ſo dried that I could not extend them, yet they appear, by the folds, to be ſhaped like thoſe which painters have given to dragons and other winged monſters that ſerve as ſupporters to coats of arms. Its body is covered with impenetrable ſcales; its legs have two joints, and its feet are hoofed like thoſe of an aſs: it has five rows of very white and ſharp teeth in each jaw, and is in length about four feet, though it was longer when alive, it having ſhrunk as it became dry.

"It was caught in a net with mackerel; and being dragged on ſhore, was knocked down with a ſtretcher or boat-hook. The net being opened, it ſuddenly ſprung up, and flew above 50 yards: the man who firſt ſeized it had ſeveral of his fingers bitten off; and the wound mortifying, he died. It afterwards faſtened on the man's arm who ſhows it, and lacerated it ſo much, that the muſcles are ſhrunk, and the hand and fingers diſtorted; the wound is not yet healed, and is thought to be incurable. It is ſaid by ſome to have been deſcribed by naturaliſts under the name of the *Sea-dragon*." We muſt add to the account now given of the monſter called a *ſea-dragon*, that we think it extremely probable that the animal was nothing more than a diſtorted or overgrown individual of ſome of the well known ſpecies of fiſh.

SEA-Gage. See *Sea-GAGE*.

SEA-Hare. See LAPLYSIA, HELMINTHOLOGY *Index*.

SEA-Horſe, in *Ichthyology*, the Engliſh name of the *Hippocampus*. See SYNGNATHUS, ICHTHYOLOGY *Index*.

SEA-Lemon. See DORIS, HELMINTHOLOGY *Index*.

SEA-Lion. See PHOCA, MAMMALIA *Index*.

SEA-Mall, or *SEA-Mew*. See LARUS, ORNITHOLOGY *Index*.

SEA-Man. See MERMAID.

SEA-Marks. The erection of beacons, light-houſes, and ſea-marks, is a branch of the royal PREROGATIVE. By 8 Eliz. 13. the corporation of the Trinity-houſe are empowered to ſet up any beacons or ſea-marks wherever they ſhall think them neceſſary; and if the owner of the land or any other perſon ſhall deſtroy them, or take down any ſteeple, tree, or other known ſea-mark, he ſhall forfeit 100l. ſterling; or, in caſe of inability to pay it, he ſhall be *ipſo facto* outlawed.

SEA-Needle, *Gar-fiſh*. See ESOX, ICHTHYOLOGY *Index*.

SEA-Nettle. See *ANIMAL-Flower*.

SEA-Pie, or *Oyſter-Catcher*. See HÆMATOPUS, ORNITHOLOGY *Index*.

SEA-Plants, are thoſe vegetables that grow in ſalt-water within the ſhores of the ſea. The old botaniſts divided

Sea. divided theſe into three claſſes. 1. The firſt claſs, according to their arrangement, contained the *algæ*, the *fuci*, the *ſea-moſſes* or *confervas*, and the different ſpecies of ſponges. 2. The ſecond contained ſubſtances of a hard texture, like ſtone or horn, which ſeem to have been of the ſame nature with what we call *zoophyta*, with this difference, that we refer ſponges to this claſs and not to the firſt. The third claſs was the ſame with our *lithophyta*, comprehending *corals*, *mandrepora*, &c. It is now well known that the genera belonging to the ſecond and third of theſe claſſes, and even ſome referred to the firſt, are not vegetables, but animals, or the productions of animals. See CORALLINA, MADREPORA, SPONGIA. Sea-plants, then, properly ſpeaking, belong to the claſs of cryptogamia, and the order of algæ; and, according to Bomare, are all comprehended under the genus of fucus. We may alſo add ſeveral ſpecies of the ulva and conferva and the ſargazo. The fuci and marine ulvæ are immerſed in the ſea, are ſeſſile, and without root. The marine confervæ are either ſeſſile or floating. The ſargazo grows beyond ſoundings.

As ſome ſpecies of the fucus, when dried and preſerved, are extremely beautiful, the curious, and eſpecially thoſe who proſecute the ſtudy of botany, muſt be anxious to know the beſt method of preſerving them, without deſtroying their colour and beauty. The following method is recommended by M. Mauduyt. Take a ſheet of paper, or rather of paſteboard, and cover it with varniſh on both ſides; and having rowed in a boat to the rock where the fucus abounds, plunge your varniſhed paper into the water, and, detaching the fucus, receive it upon the paper. Agitate the paper gently in the water, that the plant may be properly ſpread over it; and lift them up together ſoftly out of the water: then fix down with pins the ſtrong ſtalks, that they may not be diſplaced, and leave the plant lying upon the varniſhed paper to dry in the open air. When it is fully dry, the different parts will retain their poſition, and the plant may be preſerved within the leaves of a book. To free it from the ſlime and ſalt which adhere to it, waſh it gently in freſh water, after being removed from the rock on which it grew.

SEA-Serpent, a monſtrous creature, ſaid to inhabit the northern ſeas about Greenland and the coaſts of Norway. The following marvellous account of this monſter is given by Guthrie. "In 1756, one of them was ſhot by a maſter of a ſhip: its head reſembled that of a horſe; the mouth was large and black, as were the eyes, a white mane hanging from its neck: it floated on the ſurface of the water, and held its head at leaſt two feet out of the ſea: between the head and neck were ſeven or eight folds, which were very thick; and the length of this ſnake was more than 100 yards, ſome ſay fathoms. They have a remarkable averſion to the ſmell of caſtor; for which reaſon, ſhip, boat, and bark maſters provide themſelves with quantities of that drug, to prevent being overſet, the ſerpent's olfactory nerves being remarkably exquiſite. The particularities related of this animal would be incredible, were they not atteſted upon oath. Egede, a very reputable author, ſays, that on the 6th day of July 1734, a large and frightful ſea-monſter raiſed itſelf ſo high out of the water, that its head reached above the main-top-maſt of the ſhip; that it had a long ſharp ſnout, broad paws, and ſpouted water like a whale; that the body ſeemed to be covered with ſcales; the ſkin was uneven and wrinkled, and the lower part was formed like a ſnake. The body of this monſter is ſaid to be as thick as a hogſhead; his ſkin is variegated like a tortoiſe ſhell; and his excrement, which floats upon the ſurface of the water, is corroſive." Notwithſtanding the belief of Guthrie, and the teſtimony which he produces, we cannot help doubting of the exiſtence of the ſea-ſerpent. Its bulk is ſaid to be ſo diſproportionate to all the known animals of our globe, that it requires more than ordinary evidence to render it credible; but the evidence which is offered is ſo very feeble and unſatisfactory, that no man of ſound judgement would think it ſufficient to eſtabliſh the truth of an extraordinary fact. Sea.

Attempts have lately been made to revive the opinion of the exiſtence of ſea-mermaids and ſea-ſerpents. An individual of the latter, it is ſuppoſed, was ſome time ago thrown on ſhore in Orkney. Part of the ſkeleton is ſaid to be in the muſeum of the Univerſity of Edinburgh, and another part is in the poſſeſſion of Mr Home of London, who thinks that it may have belonged to an individual of ſome of the whale tribe, perhaps a monſter of that tribe; but according to others it is to be conſidered as conſtituting a diſtinct genus. We cannot avoid obſerving, that this point muſt remain unſettled till other ſpecies of this new genus have been diſcovered, or at leaſt till an entire individual have been deſcribed by an experienced naturaliſt.

SEA-Sickneſs, a diſorder incident to moſt perſons on their firſt going to ſea, occaſioned by the agitation of the veſſel. This diſorder has not been much treated of, although it is very irkſome and diſtreſſing to the patient during its continuance. It has, however, been found beneficial in aſthmatic and pulmonary complaints, and the inſtances in which it has proved fatal, are extremely rare. The ſea-ſickneſs appears to be a ſpaſmodic affection of the ſtomach, occaſioned by the alternate preſſure and receſs of its contents againſt its lower internal ſurface, according as the riſe and fall of the ſhip oppoſe the action of gravity.

The ſeas in which the attacks of this diſorder are accompanied with the greateſt violence, are thoſe where the waves have an uninterrupted freedom of action; and of conſequence bays, gulfs and channels, may be navigated with leſs inconvenience, as the waves, meeting with more frequent reſiſtance, the veſſel does not experience that gentle uniform vacillation which induces ſickneſs, and renders the head giddy. A perſon feels leſs inconvenience from the diſorder in a ſmall veſſel on the wide ocean, on which the ſlighteſt motion of the waves makes a ſtrong impreſſion. He is alſo leſs expoſed to it in a very large veſſel deeply laden, as the waves, in this caſe, ſcarcely affect the veſſel. It is in ſhips of an ordinary ſize, and which carry but a light cargo, that the paſſenger ſuffers moſt from the ſea-ſickneſs. The ſooner it takes place after embarkation, the continuance of it becomes the more probable. It does not always ceaſe immediately on landing, but in ſome caſes continues for a conſiderable time.

Many methods of preventing, or at leaſt of mitigating this diſorder, have been recommended, of which the moſt efficacious appear to be the following.

1. Not to go on board immediately after eating, and not to eat, when on board, any large quantity at a time.

2. To

Sea.

2. To take much exercife, with as little intermiffion as poffible; as indolent paffengers are always the greateft fufferers from the diforder.

3. To keep much upon deck, even when the weather is ftormy, as the fea breeze is not fo apt to affect the ftomach as the impure air of the cabin, rendered fo for want of proper circulation.

4. Not to watch the motion of the waves, particularly when ftrongly agitated with tempeft.

5. Carefully to fhun all employments by which the mind may be haraffed, as reading, ftudying, gaming, &c. and to feek all opportunities of mental relaxation.

6. To drink occafionally liquids containing carbonic acid, as the froth of beer ftrongly fermented, or wine and Seltzer water mixed together, and fweetened with pounded fugar.

7. It will alfo be beneficial to take fulphuric acid dulcified, dropped on a bit of fugar, or in peppermint water, or ten drops of ether.

The proper diet confifts of bread and freth meat, to be eaten cold with pepper. All fweet favoured food fhould be carefully avoided, and the paffenger ought to refrain from fat, and particularly from fuch meat as is in the fmalleft degree tainted. Even the finell of flowers is injurious, for which reafon marine productions ought not to be examined; but the fumes of vinegar may be advantageoufly inhaled. The drink fhould confift of lemonade or tart wines, but never of common water. An accidental diarrhœa has often relieved the patient from fea-ficknefs, and therefore a gentle laxative in fuch a diforder feems to be indicated. It will alfo be found ufeful to apply a tonic anodyne plafter to the pit of the ftomach, fpread upon leather, and covered with linen.

When fymptoms of vomiting appear, they may often be remedied by the patient placing himfelf in a horizontal pofition on his back or belly, and lying perfectly ftill. If the fits of vomiting are too violent to be repreffed, they fhould be promoted by a ftrong dofe of falt water; not, however, to be often repeated, as it debilitates the ftomach. When the emetic operates, the patient fhould bend his body, bringing his knees towards his breaft, and fupporting his head againft a firm refting-place. His garters and cravat muft be untied, a precaution which will fecure him from the danger of a rupture.

The vomiting having fubfided, a ftate of repofe will prevent its return, and the eyes may be kept fhut for a conficerable time. The patient muft make choice of a cool, ventilated place, remembering to keep himfelf warm and well clothed, as perfpiration is highly beneficial. A gargle of fugar diffolved in vinegar is to be taken in the morning, accompanied with frequent and fpare eating. Water muft never be taken in its pure ftate, but mixed with wine, vinegar, or brandy. A glafs of wine may be taken in the morning, with an infufion of orange peel, gentian root, or peruvian bark. A glafs of punch occafionally taken will be extremely beneficial, by which perfpiration is promoted.

Sea.

Perfons accuftomed to fmoke tobacco, will find the ufe of the pipe falutary on fuch occafions, but the practice of fmoking will be injurious to all others. We may add that warm clothing, flannel fhirts, caps, trowfers, &c. are powerful remedies againft exceffive expectoration, with every other fymptom of this dreadful malady.

SEA-Star. See ASTERIAS, } HELMINTHOLOGY *Index.*
SEA-Urchin. See ECHINUS, }

SEA-Water, the falt water of the fea. The principal falts contained in fea-water are, 1ft, Common marine or culinary falt, compounded of foffil alkali or foda and marine acid; 2dly, A falt formed by the union of the fame acid with magnefian earth; and, laftly, A fmall quantity of felenite. The quantity of faline matter contained in a pint of fea-water, in the Britifh feas, is, according to Neumann, about one ounce in each pint (A).

The faltnefs of this water is fuppofed to arife from numerous mines and mountains of falt difperfed here and there in the depths of the fea. Dr Halley fuppofes that it is probable the greateft part of the fea-falt, and of all falt lakes, as the Cafpian fea, the Dead fea, the lake of Mexico, and the Titicaca in Peru, is derived from the water of the rivers which they receive: and fince this fort of lakes has no exit or difcharge but by the exhalation of vapours, and alfo fince thefe vapours are entirely freth or devoid of fuch particles, it is certain that the faltnefs of the fea and of fuch lakes muft from time to time increafe; and therefore the faltnefs at this time muft be greater than at any time heretofore. He further adds, that if, by experiments made in different ages, we could find the different quantity of falt which the fame quantity of water (taken up in the fame place, and in all other the fame circumftances) would afford, it would be eafy from thence, by rules of proportion, to find the age of the world very nearly, or the time wherein it has been acquiring its prefent faltnefs.

This opinion of Dr Halley is fo improbable, that it is furprifing fo acute a philofopher could have adopted it. That freth water rivers fhould in the courfe of many thoufand years produce faltnefs in the fea, is quite incredible. If this were the cafe, every fea or great body of water which receives rivers muft be falt, and muft poffefs a degree of faltnefs in proportion to the quantity of water which the rivers difcharge. But fo

(A) In Bergman's analyfis of fea-water taken up in the beginning of June 1776, about the latitude of the Canaries, from the depth of 60 fathoms, the folid contents of a pint of the water were,

	Grs.		
Of common falt -	$253\frac{6}{11}$		
Salited magnefia -	$69\frac{1}{11}$	3. ϑ Grs.	
Gypfum - -	$8\frac{2}{11}$	or 5 1	$10\frac{9}{11}$
Total - -	$330\frac{9}{11}$		

Sea. so far is this from being true, that the Palus Meotis and the great lakes in America do not contain ſalt but freſh water. It may indeed be objected, that the quantity of ſalt which the rivers carry along with them and depoſit in the ſea, muſt depend on the nature of the ſoil through which they flow, which may in ſome places contain no ſalt at all: and this may be the reaſon why the great lakes in America and the Palus Meotis are freſh. But to this opinion, which is merely hypothetical, there are unſurmountable objections. It is a curious fact that the ſaltneſs of the ſea is greateſt under the line, and diminiſhes gradually as we advance to the poles: We muſt therefore ſuppoſe, if Dr Halley's theory be true, that the earth contains more ſalt in the tropical regions than in the temperate zones, and more in the temperate zones than in the frigid; and conſequently that the rivers in theſe different regions contain a quantity of ſalt proportionable to their diſtance from the equator. This, however, muſt be firſt proved by experiment, and cannot be aſſumed as an eſtabliſhed fact. But there is another circumſtance that entirely deſtroys this theory. If we allow that the ſea receives its ſaltneſs from the rivers, it muſt be equally ſalt or nearly ſo in every part of the earth. For, according to a ſimple and well known principle in chemiſtry, "when any ſubſtance is diſſolved in water with the aſſiſtance of agitation, at whatever part of the water it is introduced, it will be equally diffuſed through the whole liquid." Now though it were true that a greater quantity of ſalt were introduced into the ſea under the line than towards the poles, from the conſtant agitation occaſioned by the wind and tide, the ſalt muſt ſoon pervade the whole maſs of water. To ſay that the ſuperior degree of heat in the tropical regions may diſſolve a greater quantity of ſalt, will not deſtroy our argument; for it is an eſtabliſhed principle in chemiſtry, that cold water will diſſolve nearly as great a quantity of ſalt as hot water can diſſolve.

The ſaltneſs of the ſea has alſo been aſcribed to the ſolution of ſubterraneous mines of ſalt which is ſuppoſed to abound in the bottom of the ſea and along its ſhores. But this hypotheſis cannot be ſupported. If the ſea were conſtantly diſſolving ſalt, it would ſoon become ſaturated; for it cannot be ſaid that it is deprived of any part of its ſalt by evaporation, ſince rain-water is freſh. If the ſea were to become ſaturated, neither fiſhes nor vegetables could live in it. We muſt therefore deſpair of being able to account for the ſaltneſs of the ſea by ſecond cauſes; and muſt ſuppoſe that it has been ſalt from the creation. It is impoſſible indeed to ſuppoſe that the waters of the ſea were at any period freſh ſince the formation of fiſhes and ſea-plants: for as theſe will not live in water ſaturated with ſalt, neither will they live in water that is freſh; we therefore conclude that the ſaltneſs of the ſea has been nearly the ſame in all ages. This is the ſimpleſt hypotheſis of the three that has been mentioned. It explains beſt the various phenomena, and is involved in feweſt difficulties. We ſhall, however, allow that there may be ſome exceptions; that the ſaltneſs of ſome ſeas, or of particular parts of the ſame ſea, may be increaſed by mines of rock-ſalt diſperſed near its ſhores.

With regard to the uſe of this ſalt property of ſea-water, it is obſerved, that the ſaltneſs of the ſea preſerves its waters pure and ſweet, which otherwiſe would corrupt and ſtink like a filthy lake, and conſequently that none of the myriads of creatures which now live therein could then have a being. From thence alſo the ſea-water becomes much heavier, and therefore ſhips of greater ſize and quantity may be uſed thereon. Salt-water alſo doth not freeze ſo ſoon as freſh-water, whence the ſeas are more free for navigation. We have a diſſertation, by Dr Ruſſel, concerning the medical uſes of ſea-water in diſeaſes of the glands, &c. wherein the author premiſes ſome obſervations upon the the nature of ſea-water, conſidered as impregnated with particles of all the bodies it paſſes over, ſuch as ſubmarine plants, fiſh, ſalts, minerals, &c. and ſaturated with their ſeveral effluvia, to enrich it and keep it from putrefaction: whence this fluid is ſuppoſed to contract a ſoapineſs; and the whole collection, being pervaded by the ſulphureous ſteams paſſing through it, to conſtitute what we call *ſea-water;* the confeſſed diſtinguiſhing characteriſtics of which are ſaltneſs, bitterneſs, nitroſity, and unctuoſity: whence the author concludes, that it may be juſtly expected to contribute ſignally to the improvement of phyſic. The caſes in which our author informs us we are to expect advantages from ſea-water are, 1. In all recent obſtructions of the glands of the inteſtines and meſentery. 2. All recent obſtructions of the pulmonary glands, and thoſe of the viſcera, which frequently produce conſumptions. 3. All recent glandular ſwellings of the neck, or other parts. 4. Recent tumors of the joints, if they are not ſuppurated, or become ſchirrous or cancerous, and have not carious bones for their cauſe. 5. Recent defluxions upon the glands of the eyelids. 6. All defœdations of the ſkin, from an eryſipelas to a lepra. 7. Diſeaſes of the glands of the noſe, with their uſual companion a thickneſs of the lip. 8. Obſtructions of the kidneys, where there is no inflammation, and the ſtone not large. 9. In recent obſtructions of the liver, this method will be proper, where it prevents conſtipations of the belly, and aſſiſts other medicines directed in icterical caſes. The ſame remedy is ſaid to be of ſignal ſervice in the bronchocele; and is likewiſe recommended for the prevention of thoſe bilious colics that ſo frequently affect our mariners. Sea.

Preſervation of SEA-*Water from Putrefaction.* As it is ſometimes neceſſary to preſerve ſea-water in caſks for bathing and other purpoſes, it is of importance to know how to keep it from putrefaction. Many experiments were made to determine this point by Mr Henry, and are recorded in the firſt volume of the Memoirs of the Literary and Philoſophical Society of Mancheſter. His firſt experiment we ſhall here preſent to our readers. "To one quart of ſea-water were added two ſcruples of freſh quick-lime; to another, half an ounce of common culinary ſalt; and a third was kept as a ſtandard without any addition. The mouths of the bottles being looſely covered with paper, they were expoſed to the action of the ſun in ſome of the hotteſt weather in ſummer. In about a week the ſtandard became very offenſive; and the water, with the additional quantity of ſalt, did not continue ſweet many hours longer; whereas that with lime continued many months without ever exhibiting the leaſt marks of putridity." When he added a dram more of quicklime, the whole of the magneſia contained in the water was ſeparated; and when a further addition was made, a lime-water was immediately

Sea. immediately formed. He therefore concluded, that two ſcruples of quicklime are ſufficient to preſerve a quart of ſea-water. The proportions, however, may vary a little, according to the ſtrength of the quicklime employed.

1 Different methods of freſhening ſea-water.

Freſhening of SEA-*Water.* The method of making ſea-water freſh was long a deſideratum in navigation. Many methods have been propoſed for this purpoſe. Mr Appleby publiſhed an account of a proceſs which he had inſtituted in the year 1734. He diſtilled ſea-water with a quantity of *lapis infernalis* and calcined bones; but this proceſs was ſoon laid aſide, as it was not only difficult in itſelf, but rendered the water unpalatable. Dr Butler propoſed ſoap-leys in place of Mr Appleby's ingredients; but the water was ſtill liable to the ſame objection. Dr Stephen Hales recommended powdered chalk; but his method was expenſive, and did not improve the taſte of the water. Dr Lind of Portſmouth diſtilled ſea-water without any ingredients; but as the experiment he made was performed in a veſſel containing only two quarts, with a glaſs receiver, in his ſtudy, nothing concluſive can be drawn from it for the uſe of

2 Dr Irving's

ſailors. At length Dr Irving brought the proceſs to a very high degree of ſimplicity and perfection, by which the water is obtained pure, without much expence of fuel or a complicated apparatus. For this valuable diſcovery he received a reward of 5000l. The advantages of this method remain to be ſtated, which may be reduced to the following: 1. The aboliſhing all ſtills, ſtill-heads, worm-pipes, and their tubes, which occupy ſo much ſpace as to render them totally incompatible with the neceſſary buſineſs of the ſhip; and uſing in the room of theſe the ſhip's kettle or boiler, to the top whereof may occaſionally be applied a ſimple tube, which can be eaſily made on board a veſſel at ſea, of iron plate, ſtove funnel, or tin ſheet; ſo that no ſituation can prevent a ſhip from being completely ſupplied with the means of diſtilling ſea-water. 2. In conſequence of the principles of diſtillation being fully aſcertained, the contrivance of the ſimpleſt means of obtaining the greateſt quantity of diſtilled water, by making the tube ſufficiently large to receive the whole column of vapour, and placing it nearly in a horizontal direction, to prevent any compreſſion of the fluid, which takes place ſo much with the common worm. 3. The adopting of the ſimpleſt and moſt efficacious means of condenſing vapour; for nothing more is required in the diſtillation but keeping the ſurface of the tube always wet, which is done by having ſome ſea-water at hand, and a perſon to dip a mop or ſwab into this water, and paſs it along the upper ſurface of the tube. By this operation the vapour contained in the tube will be entirely condenſed with the greateſt rapidity imaginable; for by the application of the wet mop thin ſheets of water are uniformly ſpread, and mechanically preſſed upon the ſurface of the hot tube; which being converted into vapour make way for a ſucceſſion of freſh ſheets; and thus, both by the evaporation and cloſe contact of the cold water conſtantly repeated, the heat is carried off more effectually than by any other method yet known. 4. The carrying on the diſtillation without any addition, a correct chemical analyſis of ſea-water having evinced the futility of mixing ingredients with it, either to prevent an acid from riſing with the vapour, or to deſtroy any bituminous oil ſuppoſed to exiſt in ſea-water, and to contaminate the diſtilled water, giving it that fiery unpalatable taſte inſeparable from the former proceſſes. 5. The aſcertaining the proper quantity of ſea-water that ought to be diſtilled, whereby the freſh water is prevented from contracting a noxious impregnation of metallic ſalts, and the veſſel from being corroded and otherwiſe damaged by the ſalts caking on the bottom of it. 6. The producing a quantity of ſweet and wholeſome water, perfectly agreeable to the taſte, and ſufficient for all the purpoſes of ſhipping. 7. The taking advantage of the dreſſing the ſhip's proviſions, ſo as to diſtil a very conſiderable quantity of water from the vapour, which would otherwiſe be loſt, without any addition of fuel. To ſum up the merits of this method in a few words: The uſe of a ſimple tube, of the moſt eaſy conſtruction, applicable to any ſhip's kettle. The rejecting all ingredients; aſcertaining the proportion of water to be diſtilled, with every advantage of quality, ſaving of fuel, and preſervation of boilers. The obtaining freſh water, wholeſome, palatable, and in ſufficient quantities. Taking advantage of the vapour which aſcends in the kettle while the ſhip's proviſions are boiling. All theſe advantages are obtained by the above mentioned ſimple addition to the common ſhip's kettles. But Dr Irving propoſes to introduce two further improvements. The firſt is a hearth, or ſtove, ſo conſtructed that the fire which is kept up the whole day for the common buſineſs of the ſhip ſerves likewiſe for diſtillation; whereby a ſufficient quantity of water for all the economical purpoſes of the ſhip may be obtained, with a very inconſiderable addition to the expence of fuel. The other improvement is that of ſubſtituting, even in the largeſt ſhips, caſt-iron boilers, of a new conſtruction, in the place of coppers.

Sea.

3 Directions for diſtilling ſea-water.

As ſoon as ſea-water is put into the boiler, the tube is to be fitted either into the top or lid, round which, if neceſſary, a bit of wet linen may be applied, to make it fit cloſe to the mouth of the veſſel; there will be no occaſion for luting, as the tube acts like a funnel in carrying off the vapour. When the water begins to boil, the vapour ſhould be allowed to paſs freely for a minute, which will effectually clean the tube and upper part of the boiler. The tube is afterwards to be kept conſtantly wet, by paſſing a mop or ſwab, dipped in ſea water, along its upper ſurface. The waſte water running from the mop may be carried off by means of a board made like a ſpout, and placed beneath the tube. The diſtillation may be continued till three-fourths of the water be drawn off, and no further. This may be aſcertained either by a gauge-rod put into the boiler, or by meaſuring the water diſtilled. The brine is then to be let out. Water may be diſtilled in the ſame manner while the proviſions are boiling. When the tube is made on ſhore, the beſt ſubſtance for the purpoſe is thin copper well tinned, this being more durable in long voyages than tin-plates. Inſtead of mopping, the tube, if required, may have a caſe made alſo of copper, ſo much larger in diameter as to admit a thin ſheet of water to circulate between them by means of a ſpiral copper thread, with a pipe of an inch diameter at each end of the caſe; the lower for receiving cold water, and the upper for carrying it off when heated.

When only a very ſmall portion of room can be conveniently allowed for diſtillation, the machine (fig. 2.), which is only 27 inches long, may be ſubſtituted, as

Fig. 1.

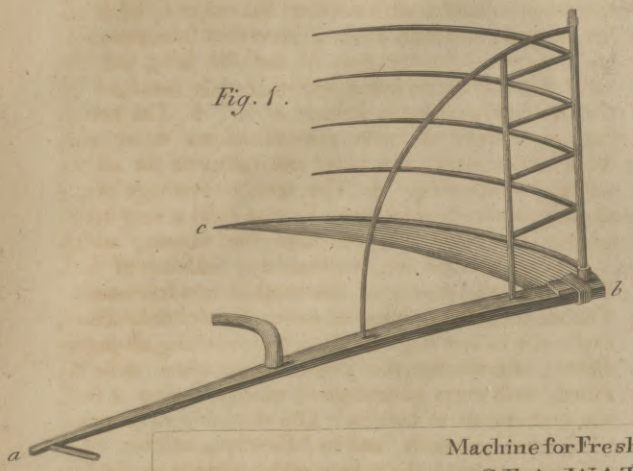


Fig. 2.

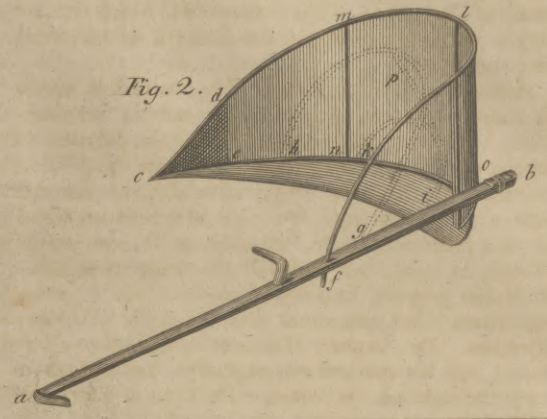


Fig. 3.



Machine for Freshening SEA WATER.

Fig. 1.

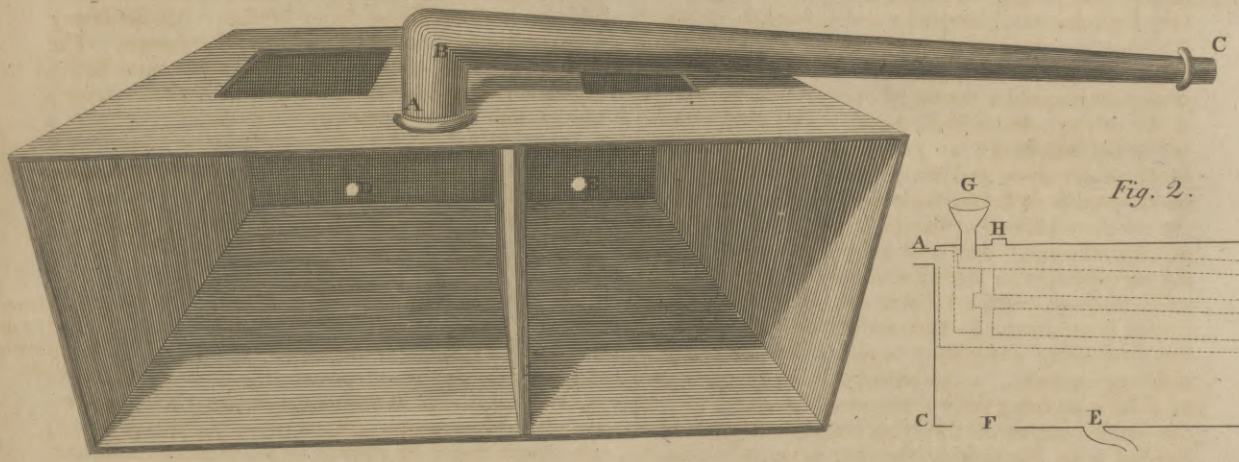


Fig. 2.

SECTOR.

Fig. 3.

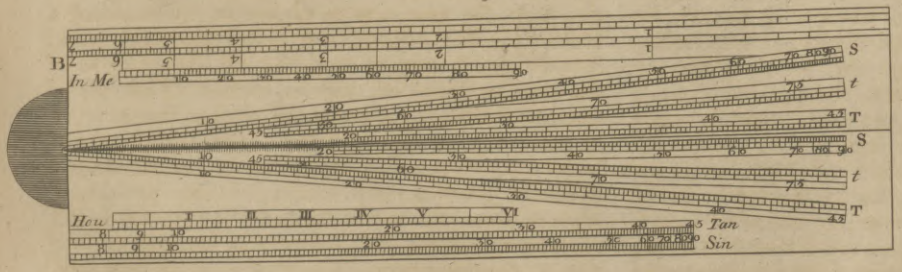


Fig. 4.

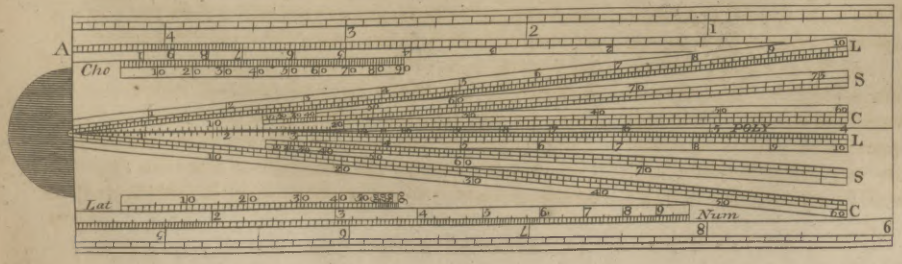
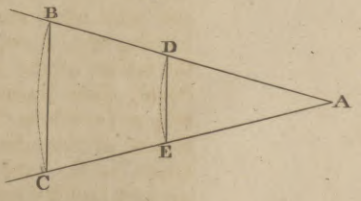
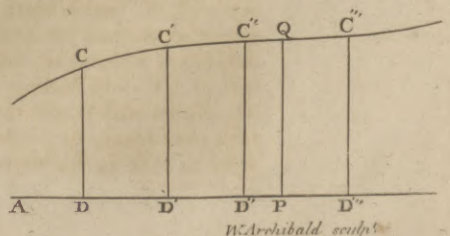


Fig. 1.



SERIES.



W. Archibald sculp.

Sea.

was done in this voyage. The principal intention of this machine, however, is to diſtil rum and other liquors; for which purpoſe it has been employed with extraordinary ſucceſs, in preventing an *empyreuma*, or fiery taſte.

Plate cccclxxviii. Fig. 1.

Figure 1. repreſents in perſpective a ſection of the two boilers taken out of the frame. In the back part at D, E, are ſeen openings for the cocks. On the top is a diſtilling tube A, B, C, five inches diameter at A, and decreaſing in ſize to three inches at C; the length from B to C is five feet. Near C is a ring to prevent the water which is applied to the ſurface from mixing with the diſtilled water. In the inſide of the tube, below B, is a ſmall lip or ledging, to hinder the diſtilled water from returning into the boiler by the rolling of the ſhip.

Fig. 2.

In figure 2. A, B, C, D, repreſent a vertical ſection of a copper box, 27 inches long, ſeven inches wide, and 11 in height, tinned on the inſide. In the bottom F is an aperture about ſix inches in diameter, having a ring to fit on the ſtill or boiler. The dotted lines which run nearly horizontal, are veſſels of thin copper, tinned on the outſide, two feet long, ſeven inches wide, and three quarters of an inch deep. At G is a funnel to receive cold water, which is conveyed into the veſſels by communicating pipes, contrived in ſuch a manner as to form a complete and quick circulation of the water through their whole extent. When the water is become hot by the action of the ſteam, it is diſcharged by the horizontal pipe at A. E is a pipe from which the diſtilled water or ſpirits run, and is bent in ſuch a form that the liquor running from it acts as a valve, and hinders any ſteam from eſcaping that way. On the top of the box, at H, is a ſafety-valve, which prevents any danger from a great accumulation of vapour not condenſed for want of a proper ſupply of cold water.

4 Lorgna's method of freſhening it by congelation.

We ſhall now mention a different method, diſcovered by the Chevalier Lorgna, by congelation of ſea-water. Sea-water requires a very great degree of cold in order to become ice. Our author found that a freezing mixture, made by mixing three parts of pounded ice with two parts of common ſalt, was quite ſufficient to freeze it. The cold produced by this mixture is equal to about 4° below 0 of Fahrenheit's thermometer.

A quantity of ſea-water is never entirely congealed, a portion of it always remaining fluid; and, what is very remarkable, this fluid part is incomparably more full of ſalt and more nauſeous than the reſt: hence, if this be ſeparated from the congealed part, the latter on being melted will be found to contain much leſs ſalt than it did before congelation. This we ſhall call *the water of the firſt purification*.

If the water of the firſt purification be again congealed, a part of it will remain fluid as in the firſt operation. This fluid portion will contain a greater proportion of ſalt than the reſt, which is of courſe more pure, and, being melted, forms the water of the ſecond purification. Thus, by repeatedly freezing the ſame ſea-water, and ſeparating the fluid from the congealed part in every operation, it is at laſt perfectly purified, ſo as to be entirely diveſted of ſalt, and as fit for drink and other purpoſes as the pureſt water that is uſed.

At firſt the ſea-water, in order to be congealed, requires a very great degree of cold, as mentioned above, the ice formed in it conſiſts rather of ſcales or filaments than of a compact body, and the quantity of the fluid parts bears a conſiderable proportion to the quantity of ice. But as the water, by undergoing the ſucceſſive congelations, becomes more and more pure, ſo it becomes capable of being congealed by a ſmaller and ſmaller degree of cold; the ice is at the ſame time more compact, and in greater quantity; the fluid part at laſt becoming very inconſiderable.

Sea, Seal.

SEA-Weed, or *Alga Marina*, is commonly uſed as a manure on the ſea-coaſt, where it can be procured in abundance. The beſt ſort grows on rocks, and is that from which kelp is made. The next to this is called the *peaſy ſea-weed;* and the worſt is that with a long ſtalk. In the neighbourhood of Berwick, the farmers mix it with ſtable-dung and earth, and thus obtain a great quantity of excellent manure. Sea-weed is found alſo to be a very fit manure for gardens, as it not only enriches them, but deſtroys the vermin by which they are uſually infeſted.

SEA-Wolf. See ANARRHICAS, ICHTHYOLOGY *Index.*

Saltneſs of the SEA. See *SEA-Water.*

South SEA. See *PACIFIC Ocean*, and *SOUTH Sea.*

SEAL, a puncheon, piece of metal, or other matter, uſually either round or oval; whereon are engraven the arms, device, &c. of ſome prince, ſtate, community, magiſtrate, or private perſon, often with a legend or inſcription; the impreſſion whereof in wax ſerves to make acts, inſtruments, &c. authentic.

The uſe of ſeals, as a mark of authenticity to letters and other inſtruments in writing, is extremely ancient. We read of it among the Jews and Perſians in the earlieſt and moſt ſacred records of hiſtory. And in the book of Jeremiah there is a very remarkable inſtance, not only of an atteſtation by ſeal, but alſo of the other uſual formalities attending a Jewiſh purchaſe. In the civil law alſo, ſeals were the evidence of truth, and were required, on the part of the witneſſes at leaſt, at the atteſtation of every teſtament. But in the times of our Saxon anceſtors, they were not much in uſe in England. For though Sir Edward Coke relies on an inſtance of King Edwyn's making uſe of a ſeal about 100 years before the Conqueſt, yet it does not follow that this was the uſage among the whole nation: and perhaps the charter he mentions may be of doubtful authority, from this very circumſtance of its being ſealed; ſince we are aſſured by all our ancient hiſtorians that ſealing was not then in common uſe. The method of the Saxons was, for ſuch as could write to ſubſcribe their names, and, whether they could write or not, to affix the ſign of the croſs; which cuſtom our illiterate vulgar do for the moſt part to this day keep up, by ſigning a croſs for their mark when unable to write their names. And indeed this inability to write, and therefore making a croſs in its ſtead, is honeſtly avowed by Cædwalla, a Saxon king, at the end of one of his charters. In like manner, and for the ſame inſurmountable reaſon, the Normans, a brave but illiterate nation, at their firſt ſettlement in France uſed the practice of ſealing only, without writing their names; which cuſtom continued when learning made its way among them, though the reaſon for doing it had ceaſed; and hence the charter of Edward the Confeſſor to Weſtminſter-abbey, himſelf being brought up in Normandy, was witneſſed only by his ſeal, and is generally thought to be the oldeſt ſealed charter of any authenticity in England.

Seal. land. At the Conqueſt, the Norman lords brought over into this kingdom their own faſhions; and introduced waxen ſeals only, inſtead of the Engliſh method of writing their names, and ſigning with the ſign of the croſs. The impreſſions of theſe ſeals were ſometimes a knight on horſeback, ſometimes other devices; but coats of arms were not introduced into ſeals, nor indeed uſed at all till about the reign of Richard I. who brought them from the croiſade in the Holy Land, where they were firſt invented and painted on the ſhields of the knights, to diſtinguiſh the variety of perſons of every Chriſtian nation who reſorted thither, and who could not, when clad in complete ſteel, be otherwiſe known or aſcertained.

This neglect of ſigning, and reſting only upon the authenticity of ſeals, remained very long among us; for it was held in all our books, that ſealing alone was ſufficient to authenticate a deed: and ſo the common form of atteſting deeds, "ſealed and delivered," continues to this day; notwithſtanding the ſtatute 29 Car. II. c. 3. revives the Saxon cuſtom, and expreſsly directs the ſigning in all grants of lands and many other ſpecies of deeds: in which, therefore, ſigning ſeems to be now as neceſſary as ſealing, though it hath been ſometimes held that the one includes the other.

The king's *great ſeal* is that whereby all patents, commiſſions, warrants, &c. coming down from the king are ſealed; the keeping whereof is in the hands of the lord chancellor. The king's *privy ſeal* is a ſeal that is uſually firſt ſet to grants that are to paſs the great ſeal.

SEAL. See *KEEPER of the Privy Seal.*

SEAL is alſo uſed for the wax or lead, and the impreſſion thereon affixed to the thing ſealed. Seal ‖ Seam.

An amalgam of mercury with gold, reduced to the conſiſtence of butter, by ſtraining off part of the mercury through leather, has been recommended as a proper material for taking off the impreſſion of ſeals in wax. In this ſtate, the compound ſcarcely contains one part of mercury to two of gold; yet is of a ſilver whiteneſs, as if there was none of the precious metal in it. In this ſtate it grows ſoft on being warmed or worked between the fingers; and is therefore proper for the purpoſe above-mentioned, but is not ſuperior to ſome amalgams made with the inferior metals, as is well known to ſome impoſtors, who have ſold for this uſe amalgams of the baſe metals as curious preparations of gold.

SEAL. See PHOCA, MAMMALIA *Index.*

SEALER, an officer in chancery appointed by the lord chancellor or keeper of the great ſeal, to ſeal the writs and inſtruments there made in his preſence.

SEALING, in *Architecture*, the fixing a piece of wood or iron in a wall with plaſter, mortar, cement, lead, or other ſolid binding. For ſtaples, hinges, and joints, plaſter is very proper.

SEALING-Wax. See WAX.

SEAM, or SEME, of corn, is a meaſure of eight buſhels.

SEAM of Glaſs, the quantity of 120 pounds, or 24 ſtones, each five pounds weight. The ſeam of wood is an horſe-load working.

SEAM, in mines, the ſame with a ſtratum or bed; as a ſeam of coal.

SEAMANSHIP.

1 Definition. BY this word we expreſs that noble art, or, more purely, the qualifications which enable a man to exerciſe the noble art of working a ſhip. A SEAMAN, in the language of the profeſſion, is not merely a mariner or labourer on board a ſhip, but a man who underſtands the ſtructure of this wonderful machine, and every ſubordinate part of its mechaniſm, ſo as to enable him to employ it to the beſt advantage for puſhing her forward in a particular direction, and for avoiding the numberleſs dangers to which ſhe is expoſed by the violence of the winds and waves. He alſo knows what courſes can be held by the ſhip, according to the wind that blows, and what cannot, and which of theſe is moſt conducive to her progreſs in her intended voyage; and he muſt be able to perform every part of the neceſſary operation with his own hands. As the ſeamen expreſs it, he muſt be able "to hand, reef, and ſteer."

2 Importance and

We are juſtified in calling it a *noble art*, not only by its importance, which it is quite needleſs to amplify or embelliſh, but by its immenſe extent and difficulty, and the prodigious number and variety of principles on which it is founded—all of which muſt be poſſeſſed in ſuch a manner that they ſhall offer themſelves without reflection in an inſtant, otherwiſe the pretended ſeaman is but a lubber, and cannot be truſted on his watch.

The art is practiſed by perſons without what we call *education*, and in the humbler walks of life, and therefore it ſuffers in the eſtimation of the careleſs ſpectator. It is thought little of, becauſe little attention is paid to it. But if multiplicity, variety, and intricacy of principles, and a ſyſtematic knowledge of theſe principles, intitle any art to the appellation of *ſcientific* and *liberal*, ſeamanſhip claims theſe epithets in an eminent degree. We are amuſed with the pedantry of the ſeaman, which appears in his whole language. Indeed it is the only pedantry that amuſes. A ſcholar, a ſoldier, a lawyer, nay, even the elegant courtier, would diſguſt us, were he to make the thouſandth part of the alluſions to his profeſſion that is well received from the jolly ſeaman; and we do the ſeaman no more than juſtice. His profeſſion *muſt* engroſs his whole mind, otherwiſe he can never learn it. He poſſeſſes a prodigious deal of knowledge; but the honeſt tar cannot tell what he knows, or rather what he feels, for his ſcience is really at his fingers ends. We can ſay with confidence, that if a perſon of education, verſed in mechanics, and acquainted with the ſtructure of a ſhip, were to obſerve with attention the movements which are made on board a firſt or ſecond rate ſhip of war during a ſhifting ſtorm, under the direction of an intelligent officer, he would be rapt in admiration. 3 Difficulty of the art.

What a pity it is that an art ſo important, ſo difficult, and ſo intimately connected with the invariable laws of mechanical nature, ſhould be ſo held by its poſſeſſors, that it cannot improve, but muſt die with each individual. Having no advantages of previous education,

tion, they cannot arrange their thoughts; they can hardly be ſaid to think. They can far leſs expreſs or communicate to others the intuitive knowledge which they poſſeſs; and their art, acquired by habit alone, is little different from an inſtinct. We are as little intitled to expect improvement here as in the architecture of the bee or the beaver. The ſpecies (pardon the alluſion, ye generous hearts of oak) cannot improve. Yet a ſhip is a machine. We know the forces which act on it, and we know the reſults of its conſtruction—all theſe are as fixed as the laws of motion. What hinders this to be reduced to a ſet of practical maxims, as well founded and as logically deduced as the working of a ſteam engine or a cotton mill. The ſtoker or the ſpinner acts only with his hands, and may "whiſtle as he works, for want of thought;" but the mechaniſt, the engineer, thinks for him, improves his machine, and directs him to a better practice. May not the rough ſeaman look for the ſame aſſiſtance; and may not the ingenious ſpeculatiſt in his cloſet unravel the intricate thread of mechaniſm which connects all the manual operations with the unchangeable laws of nature, and both furniſh the ſeaman with a better machine and direct him to a more dexterous uſe of it?

4 which has been zealouſly cultivated by the French philoſophers.

We cannot help thinking that much may be done; nay, we may ſay that much has been done. We think highly of the progreſſive labours of Renaud, Pitot, Bouguer, Du Hamel, Groignard, Bernoulli, Euler, Romme, and others; and are both ſurpriſed and ſorry that Britain has contributed ſo little in theſe attempts. Gordon is the only one of our countrymen who has given a profeſſedly ſcientific treatiſe on a ſmall branch of the ſubject. The government of France has always been ſtrongly impreſſed with the notion of great improvements being attainable by ſyſtematic ſtudy of this art; and we are indebted to the endeavours of that ingenious nation for any thing of practical importance that has been obtained. M. Bouguer was profeſſor of hydrology at one of the marine academies of France, and was enjoined, as part of his duty, to compoſe diſſertations both on the conſtruction and the working of ſhips. His *Traité du Navire*, and his *Manœuvre des Vaiſſeaux*, are undoubtedly very valuable performances: So are thoſe of Euler and Bernoulli, conſidered as mathematical diſſertations, and they are wonderful works of genius, conſidered as the productions of perſons who hardly ever ſaw a ſhip, and were totally unacquainted with the profeſſion of a ſeaman. In this reſpect Bouguer had great ſuperiority, having always lived at a ſea port, and having made many very long voyages. His treatiſes therefore are infinitely better accommodated to the demands of the ſeaman, and more directly inſtructive; but ſtill the author is more a mathematician than an artiſt, and his performance is intelligible only to mathematicians. It is true, the academical education of the young gentlemen of the French navy is ſuch, that a great number of them may acquire the preparatory knowledge that is neceſſary; and we are well informed that, in this reſpect, the officers of the Britiſh navy are greatly inferior to them.

5 Argument againſt the utility of their performances,

But this very circumſtance has furniſhed to many perſons an argument againſt the utility of thoſe performances. It is ſaid that, "notwithſtanding this ſuperior mathematical education, and the poſſeſſion of thoſe boaſted performances of M. Bouguer, the French are greatly inferior, in point of ſeamanſhip, to our countrymen, who have not a page in their language to inſtruct them, and who could not peruſe it if they had it." Nay, ſo little do the French themſelves ſeem ſenſible of the advantage of theſe publications, that no perſon among them has attempted to make a familiar abridgement of them, written in a way fitted to attract attention; and they ſtill remain neglected in their original abſtruſe and unintereſting form.

We wiſh that we could give a ſatisfactory anſwer to this obſervation. It is juſt, and it is important. Theſe very ingenious and learned diſſertations are by no means ſo uſeful as we ſhould expect. They are large books, and appear to contain much; and as their plan is logical, it ſeems to occupy the whole ſubject, and therefore to have done almoſt all that can be done. But, alas! they have only opened the ſubject, and the ſtudy is yet in its infancy. The whole ſcience of the art muſt proceed on the knowledge of the impulſions of the wind and water. Theſe are the forces which act on the machine; and its motions, which are the ultimatum of our reſearch, whether as an end to be obtained or as a thing to be prevented, muſt depend on theſe forces. Now it is with reſpect to this fundamental point that we are as yet almoſt totally in the dark. And, in the performances of M. Bouguer, as alſo in thoſe of the other authors we have named, the theory of theſe forces, by which their quantity and the direction of their action are aſcertained, is altogether erroneous; and its reſults deviate ſo enormouſly from what is obſerved in the motions of a ſhip, that the perſon who ſhould direct the operations on ſhipboard, in conformity to the maxims deducible from M. Bouguer's propoſitions, would be baffled in moſt of his attempts, and be in danger of loſing the ſhip. The whole proceeds on the ſuppoſed truth of that theory which ſtates the impulſe of a fluid to be in the proportion of the ſquare of the ſine of the angle of incidence; and that its action on any ſmall portion, ſuch as a ſquare foot of the ſails or hull, is the ſame as if that portion were detached from the reſt, and were expoſed, ſingle and alone, to the wind or water in the ſame angle. But we have ſhown, in the article *RESISTANCE of Fluids*, both from theory and experience, that both of theſe principles are erroneous, and this to a very great degree, in caſes which occur moſt frequently in practice, that is, in the ſmall angles of inclination. When the wind falls nearly perpendicular on the ſails, theory is not very erroneous: but in theſe caſes, the circumſtances of the ſhip's ſituation are generally ſuch that the practice is eaſy, occurring almoſt without thought; and in this caſe, too, even conſiderable deviations from the very beſt practice are of no great moment. The intereſting caſes, where the intended movement requires or depends upon very oblique actions of the wind on the ſails, and its practicability or impracticability depends on a very ſmall variation of this obliquity; a miſtake of the force, either as to intenſity or direction, produces a mighty effect on the reſulting motion. This is the caſe in ſailing to windward; the moſt important of all the general problems of ſeamanſhip. The trim of the ſails, and the courſe of the ſhip, ſo as to gain moſt on the wind, are very nice things; that is, they are confined within very narrow limits, and a ſmall miſtake produces a very conſiderable effect. The ſame thing obtains in many of the nice pro-

6 which are confeſſedly erroneous in their fundamental principles;

blems of tacking, box-hauling, wearing after lying to in a ſtorm, &c.

The error in the ſecond aſſertion of the theory is ſtill greater, and the action on one part of the ſail or hull is ſo greatly modified by its action on another adjoining part, that a ſtay-ſail is often ſeen hanging like a looſe rag, although there is nothing between it and the wind; and this merely becauſe a great ſail in its neighbourhood ſends off a lateral ſtream of wind, which completely hinders the wind from getting at it. Till the theory of the action of fluids be eſtabliſhed, therefore, we cannot tell what are the forces which are acting on every point of the ſail and hull: Therefore we cannot tell either the mean intenſity or direction of the whole force which acts on any particular ſail, nor the intenſity and mean direction of the reſiſtance to the hull; circumſtances abſolutely neceſſary for enabling us to ſay what will be their energy in producing a rotation round any particular axis. In like manner, we cannot, by ſuch a computation, find the ſpontaneous axis of converſion (ſee ROTATION), or the velocity of ſuch converſion. In ſhort, we cannot pronounce with tolerable confidence *à priori* what will be the motions in any caſe, or what diſpoſitions of the ſails will produce the movement we wiſh to perform. The experienced ſeaman learns by habit the general effects of every diſpoſition of the ſails; and though his knowledge is far from being accurate, it ſeldom leads him into any very blundering operation. Perhaps he ſeldom makes the beſt adjuſtment poſſible, but ſeldomer ſtill does he deviate very far from it; and in the moſt general and important problems, ſuch as working to windward, the reſult of much experience and many corrections has ſettled a trim of the ſails, which is certainly not far from the truth, but (it muſt be acknowledged) deviates widely and uniformly from the theories of the mathematician's cloſet, The honeſt tar, therefore, muſt be indulged in his joke on the uſeleſs labours of the mathematician, who can neither hand, reef, nor ſteer.

After this account of the theoretical performances in the art of ſeamanſhip, and what we have ſaid in another place on the ſmall hopes we entertain of ſeeing a perfect theory of the impulſe of fluids, it will not be expected that we enter very minutely on the ſubject in this place; nor is it our intention. But let it be obſerved, that the theory is defective in one point only; and although this is a moſt important point, and the errors in it deſtroy the concluſions of the chief propoſitions, the reaſonings remain in full force, and the *modus operandi* is preciſely ſuch as is ſtated in the theory. The *principles* of the art are therefore to be found in theſe treatiſes; but falſe inferences have been drawn, by computing from erroneous quantities. The rules and the practice of the computation, however, are ſtill beyond controverſy: Nay, ſince the proceſs of inveſtigation is legitimate, we may make uſe of it in order to diſcover the very circumſtance in which we are at preſent miſtaken: for by converting the propoſition, inſtead of finding the motions by means of the ſuppoſed forces, combined with the known mechaniſm, we may diſcover the forces by means of this mechaniſm and the obſerved motions.

7 though uſe may be made of them.

8 Deſign of this article.

We ſhall therefore in this place give a very general view of the movements of a ſhip under ſail, ſhowing how they are produced and modified by the action of the wind on her ſails, the water on her rudder and on her bows. We ſhall not attempt a preciſe determination of any of theſe movements; but we ſhall ſay enough to enable the curious landſman to underſtand how this mighty machine is managed amidſt the fury of the winds and waves: and, what is more to our wiſh, we hope to enable the uninſtructed but thinking ſeaman to generaliſe that knowledge which he poſſeſſes; to claſs his ideas, and give them a ſort of rational ſyſtem; and even to improve his practice, by making him ſenſible of the immediate operation of every thing he does, and in what manner it contributes to produce the movement which he has in view.

9 A ſhip conſidered as in free ſpace impelled and reſiſted by oppoſite forces.

A ſhip may be conſidered at preſent as a maſs of inert matter in free ſpace, at liberty to move in every direction, according to the forces which impel or reſiſt her: and when ſhe is in actual motion, in the direction of her courſe, we may ſtill conſider her as at reſt in abſolute ſpace, but expoſed to the impulſe of a current of water moving equally faſt in the oppoſite direction: for in both caſes the preſſure of the water on her bows is the ſame; and we know that it is poſſible, and frequently happens in currents, that the impulſe of the wind on her ſails, and that of the water on her bows, balance each other ſo preciſely, that ſhe not only does not ſtir from the place, but alſo remains ſteadily in the ſame poſition, with her head directed to the ſame point of the compaſs. This ſtate of things is eaſily conceived by any perſon accuſtomed to conſider mechanical ſubjects, and every ſeaman of experience has obſerved it. It is of importance to conſider it in this point of view, becauſe it gives us the moſt familiar notion of the manner in which theſe forces of the wind and water are ſet in oppoſition, and made to balance or not to balance each other by the intervention of the ſhip, in the ſame manner as the goods and the weights balance each other in the ſcales by the intervention of a beam or ſteelyard.

10 Impulſe of the wind on the ſails oppoſite to that of the water on the bows.

When a ſhip proceeds ſteadily in her courſe, without changing her rate of ſailing, or varying the direction of her head, we muſt in the firſt place conceive the accumulated impulſes of the wind on all her ſails as preciſely equal and directly oppoſite to the impulſe of the water on her bows. In the next place, becauſe the ſhip does not change the direction of her keel, ſhe reſembles the balanced ſteelyard, in which the energies of the two weights, which tend to produce rotations in oppoſite directions, and thus to change the poſition of the beam, mutually balance each other round the fulcrum; ſo the energies of the actions of the wind on the different ſails balance the energies of the water on the different parts of the hull.

The ſeaman has two principal taſks to perform. The firſt is to keep the ſhip ſteadily in that courſe which will bring her fartheſt on in the line of her intended voyage. This is frequently very different from that line, and the choice of the beſt courſe is ſometimes a matter of conſiderable difficulty. It is ſometimes poſſible to ſhape the courſe preciſely along the line of the voyage; and yet the intelligent ſeaman knows that he will arrive ſooner, or with greater ſafety, at his port, by taking a different courſe; becauſe he will gain more by increaſing his ſpeed than he loſes by increaſing the diſtance. Some principle muſt direct him in the ſelection of this courſe. This we muſt attempt to lay before the reader.

11 Skill of the ſeaman diſplayed in ſhaping his courſe.

Having choſen ſuch a courſe as he thinks moſt advantageous,

tageous, he must set such a quantity of sail as the strength of the wind will allow him to carry with safety and effect, and must trim the sails properly, or so adjust their positions to the direction of the wind, that they may have the greatest possible tendency to impel the ship in the line of her course, and to keep her steadily in that direction.

His other task is to produce any deviations which he sees proper from the present course of the ship; and to produce these in the most certain, the safest, and the most expeditious manner. It is chiefly in this movement that the mechanical nature of a ship comes into view, and it is here that the superior address and resource of an expert seaman is to be perceived.

Under the article SAILING some notice has been taken of the first task of the seaman, and it was there shown how a ship, after having taken up her anchor and fitted her sails, accelerates her motion, by degrees which continually diminish, till the increasing resistance of the water becomes precisely equal to the diminished impulse of the wind, and then the motion continues uniformly the same so long as the wind continues to blow with the same force and in the same direction.

It is perfectly consonant to experience that the impulse of fluids is in the duplicate ratio of the relative velocity. Let it be supposed that when water moves one foot per second, its perpendicular pressure or impulse on a square foot is m pounds. Then, if it be moving with the velocity V estimated in feet per second, its perpendicular impulse on a surface S, containing any number of square feet, must be $m\,SV^2$.

In like manner, the impulse of air on the same surface may be represented by $n\,S\,V^2$; and the proportion of the impulse of these two fluids will be that of m to n. We may express this by the ratio of q to 1, making

$$\frac{m}{n} = q.$$

12 Impulse of the water computed in ounces on the square foot.

M. Bouguer's computations and tables are on the supposition that the impulse of sea-water moving one foot per second is 23 ounces on a square foot, and that the impulse of the wind is the same when it blows at the rate of 24 feet per second. These measures are all French. They by no means agree with the experiments of others; and what we have already said, when treating of the *RESISTANCE of Fluids*, is enough to show us that nothing like precise measures can be expected. It was shown as the result of a rational investigation, and confirmed by the experiments of Buat and others, that the impulsions and resistances at the same surface, with the same obliquity of incidence and the same velocity of motion, are different according to the form and situation of the adjoining parts. Thus the total resistance of a thin board is greater than that of a long prism, having this board for its front or bow, &c.

We are greatly at a loss what to give as absolute measures of these impulsions.

1. With respect to water. The experiments of the French academy on a prism two feet broad and deep and four feet long, indicate a resistance of 0,973 pounds avoirdupois to a square foot, moving with the velocity of one foot per second at the surface of still water.

Mr Buat's experiments on a square foot wholly immersed in a stream were as follow:

A square foot as a thin plate -	1,81 pounds.
Ditto as the front of a box one foot long - - - - -	1,42
Ditto as the front of a box three feet long - - - - -	1,29

The resistance of sea-water is about $\frac{1}{13}$ greater.

2. With respect to air, the varieties are as great.—The resistance of a square foot to air moving with the velocity of one foot per second appears from Mr Robins's experiments on 16 square inches to be on a square foot - - - 0,001596 pounds,

Chevalier Borda's on 16 inches	0,001757
——————— on 81 inches	0,002042
Mr Rouse's on large surfaces	0,002291

Precise measures are not to be expected, nor are they necessary in this inquiry. Here we are chiefly interested in their proportions, as they may be varied by their mode of action in the different circumstances of obliquity and velocity.

We begin by recurring to the fundamental proposition concerning the impulse of fluids, viz. that the absolute pressure is always in a direction perpendicular to the impelled surface, whatever may be the direction of the stream of fluid. We must therefore illustrate the doctrine, by always supposing a flat surface of sail stretched on a yard, which can be braced about in any direction, and giving this sail such a position and such an extent of surface that the impulse on it may be the same both as to direction and intensity with that on the real sails. Thus the consideration is greatly simplified. The direction of the impulse is therefore perpendicular to the yard. Its intensity depends on the velocity with which the wind meets the sail, and the obliquity of its stroke. We shall adopt the constructions founded on the common doctrine, that the impulse is as the square of the sine of the inclination, because they are simple; whereas, if we were to introduce the values of the oblique impulses, such as they have been observed in the excellent experiments of the Academy of Paris, the constructions would be complicated in the extreme, and we could hardly draw any consequences which would be intelligible to any but expert mathematicians. The conclusions will be erroneous, not in kind but in quantity only; and we shall point out the necessary corrections, so that the final results will be found not very different from real observation.

13 Direct impulse on the sail perpendicular to the yard.

If a ship were a round cylindrical body like a flat tub, floating on its bottom, and fitted with a mast and sail in the centre, she would always sail in a direction perpendicular to the yard. This is evident. But she is an oblong body, and may be compared to a chest, whose length greatly exceeds its breadth. She is so shaped, that a moderate force will push her through the water with the head or stern foremost; but it requires a very great force to push her sidewise with the same velocity. A fine sailing ship of war will require about 12 times as much force to push her sidewise as to push her head foremost. In this respect therefore she will very much resemble a chest whose length is 12 times its breadth; and whatever be the proportion of these resistances in different ships, we may always substitute a box which shall have the same resistances headwise and sidewise.

14 A ship compared to an oblong box.

Let EFGH (fig. 1.) be the horizontal section of such

Plate CCCCLXXIX Fig. 1.

such a box, and AB its middle line, and C its centre. In whatever direction this box may chance to move, the direction of the whole reſiſtance on its two ſides will paſs through C. For as the whole ſtream has one inclination to the ſide EF, the equivalent of the equal impulſes on every part will be in a line perpendicular to the middle of EF. For the ſame reaſon, it will be in a line perpendicular to the middle of FG. Theſe perpendiculars muſt croſs in C. Suppoſe a maſt erected at C, and YC *y* to be a yard hoiſted on it carrying a ſail. Let the yard be firſt conceived as braced right athwart at right angles to the keel, as repreſented by Y′ *y*′. Then, whatever be the direction of the wind abaft this ſail, it will impel the veſſel in the direction CB. But if the ſail has the oblique poſition Y *y*, the impulſe will be in the direction CD perpendicular to CY, and will both puſh the veſſel ahead and ſidewiſe: For the impulſe CD is equivalent to the two impulſes CK and CI (the ſides of a rectangle of which CD is the diagonal). The force CI puſhes the veſſel ahead, and CK puſhes her ſidewiſe. She muſt therefore take ſome intermediate direction *a b*, ſuch that the reſiſtance of the water to the plane FG is to its reſiſtance to the plane EF as CI to CK.

15 Makes leeway when not ſailing directly before the wind.

The angle *b* CB between the real courſe and the direction of the head is called the LEEWAY; and in the courſe of this diſſertation we ſhall expreſs it by the ſymbol *x*. It evidently depends on the ſhape of the veſſel and on the poſition of the yard. An accurate knowledge of the quantity of leeway, correſponding to different circumſtances of obliquity of impulſe, extent of ſurface, &c. is of the utmoſt importance in the practice of navigation; and even an approximation is valuable. The ſubject is ſo very difficult that this muſt content us for the preſent.

16 How to find the quantity of leeway,

Let V be the velocity of the ſhip in the direction C *b*, and let the ſurfaces FG and FE be called A′ and B′. Then the reſiſtance to the lateral motion is $m V^2 \times B' \times \text{fine}^2, bCB$, and that to the direct motion is $m V^2 \times A' \times \text{fine}^2, bCK$, or $m V^2 \times A' \times \text{cof.}^2 bCB$. Therefore theſe reſiſtances are in the proportion of $B' \times \text{fine}^2 x$ to $A' \times \text{cof.}^2 x$, (repreſenting the angle of leeway *b* CB by the ſymbol *x*).

Therefore we have CI : CK, or CI : ID = $A' \cdot \text{cof.}^2 x : B' \cdot \text{fine}^2 x = A' : B' \cdot \frac{\text{fine}^2 x}{\text{cof.}^2 x} = A : B \cdot \text{tangent}^2 x$.

Let the angle YCB, to which the yard is braced up, be called the TRIM of the ſails, and expreſſed by the ſymbol *b*. This is the complement of the angle DCI. Now CI : ID = rad. : tan. DCI, = 1 : tan. DCI, = 1 : cotan. *b*. Therefore we have finally 1 : cotan. $b = A' : B' \cdot \text{tan.}^2 x$, and $A' \cdot \text{cotan. } b = B' \cdot \text{tangent}^2 x$, and $\text{tan.}^2 x = \frac{A}{B} \text{cot. } b$. This equation evidently aſcertains the mutual relation between the trim of the ſails and the leeway in every caſe where we can tell the proportion between the reſiſtances to the direct and broadſide motions of the ſhip, and where this proportion does not change by the obliquity of the courſe. Thus, ſuppoſe the yard braced up to an angle of 30° with the keel. Then cotan. 30° = 1,732 very nearly. Suppoſe alſo that the reſiſtance ſidewiſe is 12 times greater than the reſiſtance headwiſe. This gives $A' = 1$ and $B' = 12$. Therefore $1{,}732 = 12 \times \text{tangent}^2 x$, and $\text{tangent}^2 x = \frac{1{,}732}{12}$, = 0,14434, and tan. x = 0,3799, and x = 20° 48′, very nearly two points of leeway.

This computation, or rather the equation which gives room for it, ſuppoſes the reſiſtances proportional to the ſquares of the ſines of incidence. The experiments of the Academy of Paris, of which an abſtract is given in the article *RESISTANCE of Fluids*, ſhow that this ſuppoſition is not far from the truth when the angle of incidence is great. In the preſent caſe the angle of incidence on the front FG is about 70°, and the experiments juſt now mentioned ſhow that the real reſiſtances exceed the theoretical ones only $\frac{1}{138}$. But the angle of incidence on EF is only 20° 48′. Experiment ſhows that in this inclination the reſiſtance is almoſt quadruple of the theoretical reſiſtances. Therefore the lateral reſiſtance is aſſumed much too ſmall in the preſent inſtance. Therefore a much ſmaller leeway will ſuffice for producing a lateral reſiſtance which will balance the lateral impulſe CK, ariſing from the obliquity of the ſail, viz. 30°. The matter of fact is, that a pretty good ſailing ſhip, with her ſails braced to this angle at a medium, will not make above five or ſix degrees leeway in ſmooth water and eaſy weather; and yet in this ſituation the hull and rigging preſent a very great ſurface to the wind, in the moſt improper poſitions, ſo as to have a very great effect in increaſing her leeway. And if we compute the reſiſtances for this leeway of ſix degrees by the actual experiments of the French Academy on the angle, we ſhall find the reſult not far from the truth; that is, the direct and lateral reſiſtances will be nearly in the proportion of CI to ID.

It reſults from this view of the matter, that the leeway is in general much ſmaller than what the uſual theory aſſigns.

17 which depends on the trim of the ſails.

We alſo ſee, that according to whatever law the reſiſtances change by a change of inclination, the leeway remains the ſame while the trim of the ſails is the ſame. The leeway depends only on the direction of the impulſe of the wind; and this depends ſolely on the poſition of the ſails with reſpect to the keel, whatever may be the direction of the wind. This is a very important obſervation, and will be frequently referred to in the progreſs of the preſent inveſtigation. Note, however, that we are here conſidering only the action on the ſails, and on the ſame ſails. We are not conſidering the action of the wind on the hull and rigging. This may be very conſiderable; and it is always in a lee direction, and augments the leeway; and its influence muſt be ſo much the more ſenſible as it bears a greater proportion to the impulſe on the ſails. A ſhip under courſes, or cloſe-reefed topſails and courſes, muſt make more leeway than when under all her canvas trimmed, to the ſame angle. But to introduce this additional cauſe of deviation here would render the inveſtigation too complicated to be of any uſe.

18 Illuſtration of this doctrine by experiments. Fig. 2.

This doctrine will be conſiderably illuſtrated by attending to the manner in which a lighter is tracked along a canal, or ſwings to its anchor in a ſtream. The track rope is made faſt to ſome ſtaple or bolt E on the deck (fig. 2.), and is paſſed between two of the timber-heads of the bow D, and laid hold of at F on ſhore. The men or cattle walk along the path FG, the rope keeps

keeps extended in the directions DF, and the lighter arranges itſelf in an oblique poſition AB, and is thus dragged along in the direction *a b*, parallel to the ſide of the canal. Or, if the canal has a current in the oppoſite direction *b a*, the lighter may be kept ſteady in its place by the rope DF made faſt to a poſt at F. In this caſe, it is always obſerved, that the lighter ſwings in a poſition AB, which is oblique to the ſtream *a b*. Now the force which retains it in this poſition, and which preciſely balances the action of the ſtream, is certainly exerted in the direction DF; and the lighter would be held in the ſame manner if the rope were made faſt at C amidſhip, without any dependence on the timberheads at D; and it would be held in the ſame poſition, if, inſtead of the ſingle rope CF, it were riding by two ropes CG and CH, of which CH is in a direction right ahead, but oblique to the ſtream, and the other CG is perpendicular to CH or AB. And, drawing DI and DK perpendicular to AB and CG, the ſtrain on the rope CH is to that on the rope CG as CI to CK. The action of the rope in theſe caſes is preciſely analogous to that of the ſail *y* Y; and the obliquity of the keel to the direction of the motion, or to the direction of the ſtream, is analogous to the leeway. All this muſt be evident to any perſon accuſtomed to mechanical diſquiſitions.

19 On models and

A moſt important uſe may be made of this illuſtration. If an accurate model be made of a ſhip, and if it be placed in a ſtream of water, and ridden in this manner by a rope made faſt at any point D of the bow, it will arrange itſelf in ſome determined poſition AB. There will be a certain obliquity to the ſtream, meaſured by the angle B*o b*; and there will be a correſponding obliquity of the rope, meaſured by the angle FCB. Let *y* CY be perpendicular to CF. Then CY will be the poſition of the yard, or trim of the ſails correſponding to the leeway *b* CB. Then, if we ſhift the rope to a point of the bow diſtant from D by a ſmall quantity, we ſhall obtain a new poſition of the ſhip, both with reſpect to the ſtream and rope; and in this way may be obtained the relation between the poſition of the ſails and the leeway, independent of all theory, and ſuſceptible of great accuracy; and this may be done with a variety of models ſuited to the moſt uſual forms of ſhips.

20 on ſhips. Fig. 3.

In farther thinking on this ſubject, we are perſuaded that theſe experiments, inſtead of being made on models, may with equal eaſe be made on a ſhip of any ſize. Let the ſhip ride in a ſtream at a mooring D (fig. 3.) by means of a ſhort hawſer BCD from her bow, having a ſpring AC on it carried out from her quarter. She will ſwing to her moorings, till ſhe ranges herſelf in a certain poſition AB with reſpect to the direction *a b* of the ſtream; and the direction of the hawſer DC will point to ſome point E of the line of the keel. Now, it is plain to any perſon acquainted with mechanical diſquiſitions, that the deviation BE*b* is preciſely the leeway that the ſhip will make when the average poſition of the ſails is that of the line GEH perpendicular to ED; at leaſt this will give the leeway which is produced by the ſails alone. By heaving on the ſpring, the knot C may be brought into any other poſition we pleaſe; and for every new poſition of the knot the ſhip will take a new poſition with reſpect to the ſtream and to the hawſer. And we perſiſt in ſaying, that more information will be got by this train of experiments than from any mathematical theory: for all the theories of the impulſes of fluids muſt proceed on phyſical poſtulates with reſpect to the motions of the filaments, which are exceedingly conjectural.

21 The compariſon of a ſhip to an oblong body is only uſeful to give clear notions on the ſubject.

And it muſt now be farther obſerved, that the ſubſtitution which we have made of an oblong parallelopiped for a ſhip, although well ſuited to give us clear notions of the ſubject, is of ſmall uſe in practice: for it is next to impoſſible (even granting the theory of oblique impulſions) to make this ſubſtitution. A ſhip is of a form which is not reducible to equations; and therefore the action of the water on her bow or broadſide can only be had by a moſt laborious and intricate calculation for almoſt every ſquare foot of its ſurface. (See *Bezout's Cours de Mathem.* vol. v. p. 72, &c.) And this muſt be different for every ſhip. But, which is more unlucky, when we have got a parallelopiped which will have the ſame proportion of direct and lateral reſiſtance for a particular angle of leeway, it will not anſwer for another leeway of the ſame ſhip; for when the leeway changes, the figure actually expoſed to the action of the water changes alſo. When the leeway is increaſed, more of the lee-quarter is acted on by the water, and a part of the weather-bow is now removed from its action. Another parallelopiped muſt therefore be diſcovered, whoſe reſiſtances ſhall ſuit this new poſition of the keel with reſpect to the real courſe of the ſhip.

We therefore beg leave to recommend this train of experiments to the notice of the ASSOCIATION FOR THE IMPROVEMENT OF NAVAL ARCHITECTURE as a very promiſing method for aſcertaining this important point. And we proceed, in the next place, to aſcertain the relation between the velocity of the ſhip and that of the wind, modified as they may be by the trim of the ſails and the obliquity of the impulſe.

22 The relation between the velocity of the ſhip and wind aſcertained. Fig. 4.

Let AB (fig. 4, 5, and 6.) repreſent the horizontal ſection of a ſhip. In place of all the drawing ſails, that is, the ſails which are really filled, we can always ſubſtitute one ſail of equal extent, trimmed to the ſame angle with the keel. This being ſuppoſed attached to the yard DCD, let this yard be firſt of all at right angles to the keel, as repreſented in fig. 4. Let the wind blow in the direction WC, and let CE (in the direction WC continued) repreſent the velocity V of the wind. Let CF be the velocity *v* of the ſhip. It muſt alſo be in the direction of the ſhip's motion, becauſe when the ſail is at right angles to the keel, the abſolute impulſe on the ſail is in the direction of the keel, and there is no lateral impulſe, and conſequently no leeway. Draw EF, and complete the parallelogram CFE*e*, producing *e* C through the centre of the yard to *w*. Then *w* C will be the relative or apparent direction of the wind, and C *e* or FE will be its apparent or relative velocity: For if the line C *e* be carried along CF, keeping always parallel to its firſt poſition, and if a particle of air move uniformly along CE (a fixed line in abſolute ſpace) in the ſame time, this particle will always be found in that point of CE where is is interſected at that inſtant by the moving line C; ſo that if C *e* were a tube, the particle of air, which really moves in the line CE, would always be found in the tube C *e*. While CE is the real direction of the wind, C *e* will be the poſition of the

vane

vane at the maſt head, which will therefore mark the apparent direction of the wind, or its motion relative to the moving ſhip.

We may conceive this in another way. Suppoſe a cannon-ſhot fired in the direction CE at the paſſing ſhip, and that it paſſes through the maſt at C with the velocity of the wind. It will not paſs through the off-ſide of the ſhip at P, in the line CE: for while the ſhot moves from C to P, the point P has gone forward, and the point *p* is now in the place where P was when the ſhot paſſed through the maſt. The ſhot will therefore paſs through the ſhip's ſide in the point *p*, and a perſon on board ſeeing it paſs through C and *p* will ſay that its motion was in the line C*p*.

23 When a ſhip is in motion the apparent direction of the wind is always different from the real direction.

Thus it happens, that when a ſhip is in motion the apparent direction of the wind is always ahead of its real direction. The line *w* C is always found within the angle WCB. It is eaſy to ſee from the conſtruction, that the difference between the real and apparent directions of the wind is ſo much the more remarkable as the velocity of the ſhip is greater: For the angle WC *w* or EC *e* depends on the magnitude of E *e* or CF, in proportion to CE. Perſons not much accuſtomed to attend to theſe matters are apt to think all attention to this difference to be nothing but affectation of nicety. They have no notion that the velocity of a ſhip can have any ſenſible proportion to that of the wind. "Swift as the wind" is a proverbial expreſſion; yet the velocity of a ſhip always bears a very ſenſible proportion to that of the wind, and even very frequently exceeds it. We may form a pretty exact notion of the velocity of the wind by obſerving the ſhadows of the ſummer clouds flying along the face of a country, and it may be very well meaſured by this method. The motion of ſuch clouds cannot be very different from that of the air below; and when the preſſure of the wind on a flat ſurface, while blowing with a velocity meaſured in this way, is compared with its preſſure when its velocity is meaſured by more unexceptionable methods, they are found to agree with all deſirable accuracy. Now obſervations of this kind frequently repeated, ſhow that what we call a pleaſant briſk gale blows at the rate of about 10 miles an hour, or about 15 feet in a ſecond, and exerts a preſſure of half a pound on a ſquare foot. Mr Smeaton has frequently obſerved the ſails of a windmill, driven by ſuch a wind, moving faſter, nay much faſter, towards their extremities, ſo that the ſail, inſtead of being preſſed to the frames on the arms, was taken aback, and fluttering on them. Nay, we know that a good ſhip, with all her ſails ſet and the wind on the beam, will in ſuch a ſituation ſail above ten knots an hour in ſmooth water. There is an obſervation made by every experienced ſeaman, which ſhows this difference between the real and apparent directions of the wind very diſtinctly. When a ſhip that is ſailing briſkly with the wind on the beam tacks about, and then ſails equally well on the other tack, the wind always appears to have ſhifted and come more ahead. This is familiar to all ſeamen. The ſeaman judges of the direction of the wind by the poſition of the ſhip's vanes. Suppoſe the ſhip ſailing due weſt on the ſtarboard tack, with the wind apparently N. N. W. the vane pointing S. S. E. If the ſhip put about, and ſands due eaſt on the larboard tack, the vane will be found no longer to point S. S. E. but perhaps S.S.W. the wind appearing N.N.E. and the ſhip muſt be nearly cloſe-hauled in order to make an eaſt courſe. The wind appears to have ſhifted four points. If the ſhip tacks again, the wind returns to its old quarter. We have often obſerved a greater difference than this. The celebrated aſtronomer Dr Bradley, taking the amuſement of ſailing in a pinnace on the river Thames, obſerved this, and was ſurpriſed at it, imagining that the change of wind was owing to the approaching to or retiring from the ſhore. The boatmen told him that it always happened at ſea, and explained it to him in the beſt manner they were able. The explanation ſtruck him, and ſet him a muſing on an aſtronomical phenomenon which he had been puzzled by for ſome years, and which he called THE ABERRATION OF THE FIXED STARS. Every ſtar changes its place a ſmall matter for half a year, and returns to it at the completion of the year. He compared the ſtream of light from the ſtar to the wind, and the teleſcope of the aſtronomer to the ſhip's vane, while the earth was like the ſhip, moving in oppoſite directions when in the oppoſite points of its orbit. The teleſcope muſt always be pointed ahead of the real direction of the ſtar, in the ſame manner as the vane is always in a direction ahead of the wind; and thus he aſcertained the progreſſive motion of light, and diſcovered the proportion of its velocity to the velocity of the earth in its orbit, by obſerving the deviation which was neceſſarily given to the teleſcope. Obſerving that the light ſhifted its direction about 40″, he concluded its velocity to be about 11,000 times greater than that of the earth; juſt as the intelligent ſeaman would conclude from this apparent ſhifting of the wind, that the velocity of the wind is about triple that of the ſhip. This is indeed the beſt method for diſcovering the velocity of the wind. Let the direction of the vane at the maſt-head be very accurately noticed on both tacks, and let the velocity of the ſhip be alſo accurately meaſured. The angle between the directions of the ſhip's head on theſe different tacks being halved, will give the real direction of the wind, which muſt be compared with the poſition of the vane in order to determine the angle contained between the real and apparent directions of the wind or the angle EC *e*; or half of the obſerved ſhifting of the wind will ſhow the inclination of its true and apparent directions. This being found, the proportion of EC to FC (fig. 6.) is eaſily meaſured.

24 Obſervation of Dr Bradley on this ſubject.

We have been very particular on this point, becauſe ſince the mutual actions of bodies depend on their relative motions only, we ſhould make prodigious miſtakes if we eſtimated the action of the wind by its real direction and velocity, when they differ ſo much from the relative or apparent.

25 Velocity of a ſhip when its ſail's are at right angles to the keel.

We now reſume the inveſtigation of the velocity of the ſhip (fig. 4.), having its ſails at right angles to the keel, and the wind blowing in the direction and with the velocity CE, while the ſhip proceeds in the direction of the keel with the velocity CF. Produce E *e*, which is parallel to BC, till it meet the yard in *g*, and draw FG perpendicular to E*g*. Let *a* repreſent the angle WCD, contained between the ſail and the real direction of the wind, and let *b* be the angle of trim DCB. CE the velocity of the wind was expreſſed by V, and CF the velocity of the ſhip by *v*.

The abſolute impulſe on the ſail is (by the uſual theory

theory) proportional to the ſquare of the relative velocity, and to the ſquare of the ſine of the angle of incidence; that is, to $FE^2 \times \text{ſin.}^2\ w\,CD$. Now the angle $GFE = w\,CD$, and EG is equal to $FE \times$ ſin. GFE; and EG is equal to $Eg - gG$. But $Eg = EC \times$ ſin. $EC\,g$, $= V \times$ ſin. a; and $gG = CF$, $= v$. Therefore $EG = V \times$ ſin. $a - v$, and the impulſe is proportional to $\overline{V \times \text{ſin. } a - v}^2$. If S repreſent the ſurface of the ſail, the impulſe, in pounds, will be $n\,S(V \times \text{ſin. } a - v)^2$.

Let A be the ſurface which, when it meets the water perpendicularly with the velocity v, will ſuſtain the ſame preſſure or reſiſtance which the bows of the ſhip actually meets with. This impulſe, in pounds, will be $m\,A\,v^2$. Therefore, becauſe we are conſidering the ſhip's motion as in a ſtate of uniformity, the two preſſures balance each other; and therefore $m\,A\,v^2 = n\,S(V \times \text{ſin. } a - v)^2$, and $\frac{m}{n}\,A\,v^2 = S\,(V \times \text{ſin. } a - v)^2$; therefore $\sqrt{\frac{m}{n}}\,\sqrt{A} \times v = \sqrt{S} \times V \times \text{ſin. } a - v\sqrt{S}$, and

$$v = \frac{\sqrt{S} \times V \times \text{ſin. } a}{\sqrt{\frac{m}{n}A} + \sqrt{S}} = \frac{V \times \text{ſin. } a}{\sqrt{\frac{mA}{nS}} + 1} = \frac{V \times \text{ſin. } a}{\sqrt{\frac{A}{qS}} + 1}.$$

We ſee, in the firſt place, that the velocity of the ſhip is (*cæteris paribus*) proportional to the velocity of the wind, and to the ſine of its incidence on the ſail jointly; for while the ſurface of the ſail S and the equivalent ſurface for the bow remains the ſame, v increaſes or diminiſhes at the ſame rate with $V \cdot$ ſin. a.—When the wind is right aſtern, the ſine of a is unity, and then the ſhip's velocity is $\frac{V}{\sqrt{\frac{mA}{nS}} + 1}$.

Note, that the denominator of this fraction is a common number; for m and n are numbers, and A and S being quantities of one kind, $\frac{A}{S}$ is alſo a number.

It muſt alſo be carefully attended to, that S expreſſes a quantity of ſail actually receiving wind with the inclination a. It will not always be true, therefore, that the velocity will increaſe as the wind is more abaft, becauſe ſome ſails will then becalm others. This obſervation is not, however, of great importance; for it is very unuſual to put a ſhip in the ſituation conſidered hitherto; that is, with the yards ſquare, unleſs ſhe be right before the wind.

If we would diſcover the relation between the velocity and the quantity of ſail in this ſimple caſe of the wind right aft, obſerve that the equation $v = \frac{V}{\sqrt{\frac{mA}{nS}} + 1}$ gives us $\sqrt{\frac{mA}{nS}}\,v + v = V$, and $\sqrt{\frac{mA}{nS}}\,v = V - v$, and $\frac{mA}{nS}\,v^2 = \overline{V - v}^2$, and $\frac{nS}{mA} = \frac{v^2}{(V-v)^2}$; and becauſe n and m and A are conſtant quantities, S is proportional to $\frac{v^2}{(V-v)^2}$, or the ſurface of ſail is proportional to the ſquare of the ſhip's velocity directly, and to the ſquare of the relative velocity inverſely. Thus, if a ſhip be ſailing with one-eighth of the velocity of the wind, and we would have her ſail with one-fourth of it, we muſt quadruple the ſail. This is more eaſily ſeen in another way. The velocity of the ſhip is proportional to the velocity of the wind; and therefore the relative velocity is alſo proportional to that of the wind, and the impulſe of the wind is as the ſquare of the relative velocity. Therefore, in order to increaſe the relative velocity by an increaſe of ſail only, we muſt make this increaſe of ſail in the duplicate proportion of the increaſe of velocity.

Let us, in the next place, conſider the motion of a ſhip whoſe ſails ſtand oblique to the keel.

26 Its velocity when the ſails ſtand oblique to the keel.

The conſtruction for this purpoſe differs a little from the former, becauſe, when the ſails are trimmed to any oblique poſition DCB (fig. 5. and 6.), there muſt be a deviation from the direction of the keel, or a leeway BC b. Call this x. Let CF be the velocity of the ſhip. Draw, as before, Eg perpendicular to the yard, and FG perpendicular to Eg; alſo draw FH perpendicular to the yard: then, as before, EG, which is in the ſubduplicate ratio of the impulſe on the ſail, is equal to $Eg - Gg$. Now Eg is, as before, $= V \times$ ſin. a, and Gg is equal to FH, which is $= CF \times$ ſin. FCH, or $= v \times$ ſin. $(b + x)$. Therefore we have the impulſe $= n\,S\,(V \cdot \text{ſin. } a - v \cdot \text{ſin. } (b+x))^2$. Fig. 5. and 6.

This expreſſion of the impulſe is perfectly ſimilar to that in the former caſe, its only difference conſiſting in the ſubductive part, which is here $v \times \text{ſin. } \overline{b+x}$ inſtead of v. But it expreſſes the ſame thing as before, viz. the diminution of the impulſe. The impulſe being reckoned ſolely in the direction perpendicular to the ſail, it is diminiſhed ſolely by the ſail withdrawing itſelf *in that direction* from the wind; and as gE may be conſidered as the real impulſive motion of the wind, GE muſt be conſidered as the relative and effective impulſive motion. The impulſe would have been the ſame had the ſhip been at reſt, and had the wind met it perpendicularly with the velocity GE.

27 Connection between the impulſe and motion of the ſhip.

We muſt now ſhow the connection between this impulſe and the motion of the ſhip. The ſail, and conſequently the ſhip, is preſſed by the wind in the direction CI perpendicular to the ſail or yard with the force which we have juſt now determined. This (in the ſtate of uniform motion) muſt be equal and oppoſite to the action of the water. Draw IL at right angles to the keel. The impulſe in the direction CI (which we may meaſure by CI) is equivalent to the impulſes CL and LI. By the firſt the ſhip is impelled right forward, and by the ſecond ſhe is driven ſidewiſe. Therefore we muſt have a leeway, and a lateral as well as a direct reſiſtance. We ſuppoſe the form of the ſhip to be known, and therefore the proportion is known, or diſcoverable, between the direct and lateral reſiſtances correſponding to every angle x of leeway. Let A be the ſurface whoſe perpendicular reſiſtance is equal to the direct reſiſtance of the ſhip correſponding to the leeway x, that is, whoſe reſiſtance is equal to the reſiſtance really felt by the ſhip's bows in the direction of the keel when ſhe is ſailing with this leeway; and let B in like manner be the ſurface whoſe perpendicular reſiſtance is equal to the actual reſiſtance to the ſhip's motion in the direction LI, perpendicular to the keel. (*N. B.* This is not equivalent to A and B′ adapted to the rectangular box, but to $A' \cdot \text{cof.}^2\ x$ and $B' \cdot \text{ſin.}^2\ x$.) We have therefore

therefore $A : B = CL : LI$, and $LI = \frac{CL \cdot B}{A}$. Alſo, becauſe $CI = \sqrt{CL^2 + LI^2}$, we have $A : \sqrt{A^2 + B^2} = CL : CI$, and $CI = \frac{CL \cdot \sqrt{A^2 + B^2}}{A}$. The reſiſtance in the direction LC is properly meaſured by $m A v^2$, as has been already obſerved. Therefore the reſiſtance in the direction IC muſt be expreſſed by $m \sqrt{A^2 + B^2}\, v^2$; or (making C the ſurface which is equal to $\sqrt{A^2 + B^2}$, and which will therefore have the ſame perpendicular reſiſtance to the water having the velocity v) it may be expreſſed by $m C v^2$.

Therefore, becauſe there is an equilibrium between the impulſe and reſiſtance, we have $m C v^2 = n S (V \cdot \text{ſin. } a - v \cdot \text{ſin. } \overline{b+x})^2$ and $\frac{m}{n} C v^2$, or $q C v^2 = S (V \cdot \text{ſin. } a - v \cdot \text{ſin. } \overline{b+x})^2$, and $\sqrt{q}\sqrt{C}\, v = \sqrt{S} (V \cdot \text{ſin. } a - v \cdot \text{ſin. } \overline{b+x})$.

$$\text{Therefore } v = \frac{\sqrt{S} \cdot V \cdot \text{ſin. } a}{\sqrt{q}\sqrt{C} + \sqrt{S} \cdot \text{ſin. } \overline{b+x}}, = \frac{V \cdot \text{ſin. } a}{\sqrt{q}\frac{\sqrt{C}}{\sqrt{S}} + \text{ſin. } \overline{b+x}} = V \frac{\text{Sin. } a}{\sqrt{q}\frac{\sqrt{C}}{\sqrt{S}} + \text{ſin. } \overline{b+x}}.$$

Obſerve that the quantity which is the coefficient of V in this equation is a common number; for ſin. a is a number, being a decimal fraction of the radius 1, Sin. $\overline{b+x}$ is alſo a number, for the ſame reaſon. And ſince m and n were numbers of pounds, $\frac{m}{n}$ or q is a common number. And becauſe C and S are ſurfaces, or quantities of one kind, $\frac{C}{S}$ is alſo a common number.

This is the ſimpleſt expreſſion that we can think of for the velocity acquired by the ſhip, though it muſt be acknowledged to be too complex to be of very prompt uſe. Its complication ariſes from the neceſſity of introducing the leeway x. This affects the whole of the denominator; for the ſurface C depends on it, becauſe C is $= \sqrt{A^2 + B^2}$, and A and B are analogous to $A' \text{ cof.}^2 x$ and $B' \text{ ſin.}^2 x$.

28 Important conſequences deduced from the foregoing theorem.

But we can deduce ſome important conſequences from this theorem.

While the ſurface S of the ſail actually filled by the wind remains the ſame, and the angle DCB, which in future we ſhall call the TRIM of the ſails, alſo remains the ſame, both the leeway x and the ſubſtituted ſurface C remains the ſame. The denominator is therefore conſtant; and the velocity of the ſhip is proportional to $\sqrt{S} \cdot V \cdot \text{ſin. } a$; that is, directly as the velocity of the wind, directly as the abſolute inclination of the wind to the yard, and directly as the ſquare root of the ſurface of the ſails.

We alſo learn from the conſtruction of the figure that FG parallel to the yard cuts CE in a given ratio. For CF is in a conſtant ratio to Eg, as has been juſt now demonſtrated. And the angle DCF is conſtant. Therefore CF $\cdot$ ſin. b, or FH or Gg, is proportional to Eg, and OC to EC, or EC is cut in one proportion, whatever may be the angle ECD, ſo long as the angle DCF is conſtant.

We alſo ſee that it is very poſſible for the velocity of the ſhip on an oblique courſe to exceed that of the wind. This will be the caſe when the number $\frac{\text{ſin. } a}{\sqrt{q\frac{C}{S} + \text{ſin. } \overline{b+x}}}$ exceeds unity, or when ſin. a is greater than $\sqrt{q\frac{C}{S} + \text{ſin. } \overline{b+x}}$. Now this may eaſily be by ſufficiently enlarging S and diminiſhing $b+x$. It is indeed frequently ſeen in fine ſailers with all their ſails ſet and not hauled too near the wind.

We remarked above that the angle of leeway x affects the whole denominator of the fraction which expreſſes the velocity. Let it be obſerved that the angle JCL is the complement of LCD, or of b. Therefore, CL : LI, or A : B = 1 : tan. ICL, = 1 : cot. b, and $B = A \cdot \text{cotan. } b$. Now A is equivalent to $A' \cdot \text{cof.}^2 x$, and thus b becomes a function of x. C is evidently ſo, being $\sqrt{A^2 + B^2}$. Therefore before the value of this fraction can be obtained, we muſt be able to compute, by our knowledge of the form of the ſhip, the value of A for every angle x of leeway. This can be done only by reſolving her bows into a great number of elementary planes, and computing the impulſes on each and adding them into one ſum. The computation is of immenſe labour, as may be ſeen by one example given by Bouguer. When the leeway is but ſmall, not exceeding ten degrees, the ſubſtitution of the rectangular priſm of one determined form is abundantly exact for all leeways contained within this limit; and we ſhall ſoon ſee reaſon for being contented with this approximation. We may now make uſe of the formula expreſſing the velocity for ſolving the chief problems in this part of the ſeaman's taſk.

29 Problem I. To determine the beſt poſition of the ſails for ſtanding on a given courſe, when the direction and velocity of the wind and its angle with the courſe are given.

And firſt let it be required to determine the beſt poſition of the ſail for ſtanding on a given courſe $a b$, when CE the direction and velocity of the wind, and its angle with the courſe WCF, are given. This problem has exerciſed the talents of the mathematicians ever ſince the days of Newton. In the article PNEUMATICS we gave the ſolution of one very nearly related to it, namely, to determine the poſition of the ſail which would produce the greateſt impulſe in the direction of the courſe. The ſolution was to place the yard CD in ſuch a poſition that the tangent of the angle FCD may be one half of the tangent of the angle DCW. This will indeed be the beſt poſition of the ſail for beginning the motion; but as ſoon as the ſhip begins to move in the direction CF, the effective impulſe of the wind is diminiſhed, and alſo its inclination to the ſail. The angle DCw diminiſhes continually as the ſhip accelerates; for CF is now accompanied by its equal eE, and by an angle ECe or WCw. CF increaſes, and the impulſe on the ſail diminiſhes, till an equilibrium obtains between the reſiſtance of the water and the impulſe of the wind. The impulſe is now meaſured by $CE^2 \times \text{ſin.}^2 e\text{CD}$ inſtead of $CE^2 \times \text{ſin.}^2 \text{ECD}$, that is, by EG^2 inſtead of Eg^2.

This introduction of the relative motion of the wind renders the actual ſolution of the problem extremely difficult.

difficult. It is very eaſily expreſſed geometrically: Divide the angle wCF in ſuch a manner that the tangent of DCF may be half of the tangent of DC w, and the problem may be conſtructed geometrically as follows.

Fig. 7. Let WCF (fig. 7.) be the angle between the ſail and courſe. Round the centre C deſcribe the circle WDFY; produce WC to Q, ſo that CQ$=\frac{1}{3}$WC, and draw QY parallel to CF cutting the circle in Y; biſect the arch WY in D, and draw DC. DC is the proper poſition of the yard.

Draw the chord WY, cutting CD in V and CF in T; draw the tangent PD cutting CF in S and CY in R.

It is evident that WY, PR, are both perpendicular to CD, and are biſected in V and D; therefore (by reaſon of the parallels QY, CF) $4:3=QW:CW$, $=YW:TW$, $=RP:SP$. Therefore $PD:PS=2:3$, and $PD:DS=2:1$. *Q. E. D.* But this diviſion cannot be made to the beſt advantage till the ſhip has attained its greateſt velocity, and the angle wCF has been produced.

We muſt conſider all the three angles, a, b, and x, as variable in the equation which expreſſes the value of v, and we muſt make the fluxion of this equation $=o$; then, by means of the equation $B=A\cdot$ cotan. b, we muſt obtain the value of b and of $\dot{b}$ in terms of x and $\dot{x}$. With reſpect to a, obſerve, that if we make the angle $WCF=p$, we have $p=a+b+x$; and p being a conſtant quantity, we have $\dot{a}+\dot{b}+\dot{x}=o$. Subſtituting for a, b, $\dot{a}$, and $\dot{b}$, their values in terms of x and $\dot{x}$, in the fluxionary equation $=o$, we readily obtain x, and then a and b, which ſolves the problem.

Let it be required, in the next place, to determine the courſe and the trim of the ſails moſt proper for plying to windward.

30 Problem II. To determine the courſe and trim of the ſails moſt proper for plying to windward. In fig. 6. draw FP perpendicular to WC. CF is the motion of the ſhip; but it is only by the motion PC that ſhe gains to windward. Now CP is $=$ CF $\times$ coſin. WCF, or $v\cdot$ coſin. $(a+b+x)$. This muſt be rendered a maximum, as follows.

By means of the equation which expreſſes the value of v and the equation $B=A\cdot$ cotan. b, we exterminate the quantities v and b; we then take the fluxion of the quantity into which the expreſſion $v\cdot$ coſ. $(a+b+x)$ is changed by this operation. Making this fluxion $=o$, we get the equation which muſt ſolve the problem. This equation will contain the two variable quantities a and x with their fluxions; then make the coefficient of $\dot{x}$ equal to o, alſo the coefficient of $\dot{a}$ equal to o. This will give two equations which will determine a and x, and from this we get $b=p-a-x$.

31 Problem III. To determine the beſt courſe and trim of the ſails for getting away from a given line of coaſt. Should it be required, in the third place, to find the beſt courſe and trim of the ſails for getting away from a given line of coaſt CM (fig. 6.), the proceſs perfectly reſembles this laſt, which is in fact getting away from a line of coaſt which makes a right angle with the wind. Therefore, in place of the angle WCF, we muſt ſubſtitute the angle WCM$=\pm$WCF. Call this angle e. We muſt make $v\cdot$ coſ. $(e\pm a\pm b\pm x)$ a maximum. The analytical proceſs is the ſame as the former, only e is here a conſtant quantity.

32 Obſervations on the preceding problems. Theſe are the three principal problems which can be ſolved by means of the knowledge that we have obtained of the motion of the ſhip when impelled by an oblique ſail, and therefore making leeway; and they may be conſidered as an abſtract of this part of M. Bouguer's work. We have only pointed out the proceſs for this ſolution, and have even omitted ſome things taken notice of by M. Bezout in his very elegant compendium. Our reaſons will appear as we go on. The learned reader will readily ſee the extreme difficulty of the ſubject, and the immenſe calculations which are neceſſary even in the ſimpleſt caſes, and will grant that it is out of the power of any but an expert analyſt to derive any uſe from them; but the mathematician can calculate tables for the uſe of the practical ſeaman. Thus he can calculate the beſt poſition of the ſails for advancing in a courſe 90° from the wind, and the velocity in that courſe; then for 85°, 80°, 75°, &c. M. Bouguer has given a table of this kind; but to avoid the immenſe difficulty of the proceſs, he has adapted it to the apparent direction of the wind. We have inſerted a few of his numbers, ſuited to ſuch caſes as can be of ſervice, namely, when all the ſails draw, or none ſtand in the way of others. Column 1ſt is the apparent angle of the wind and courſe; column 2d is the correſponding angle of the ſails and keel; and column 3d is the apparent angle of the ſails and wind.

33 M. Bouguer's table for finding the beſt poſition of the ſails for advancing in any courſe.

1 wCF	2 DCB	3 wCD
103° 53′	42° 30′	61° 23′
99 13	40 —	59 13
94 25	37 30	56 55
89 28	35 —	54 28
84 23	32 30	51 53
79 06	30 —	49 06
73 39	27 30	46 09
68 —	25 —	43 —

In all theſe numbers we have the tangent of wCD double of the tangent of DCF.

But this is really doing but little for the ſeaman. The apparent direction of the wind is unknown to him till the ſhip is ſailing with uniform velocity; and he is ſtill uninformed as to the leeway. It is, however, of ſervice to him to know, for inſtance, that when the angle of the vanes and yards is 56 degrees, the yard ſhould be braced up to 37° 30′, &c.

34 Inutility of theſe calculations.

But here occurs a new difficulty. By the conſtruction of a ſquare-rigged ſhip it is impoſſible to give the yards that inclination to the keel which the calculation requires. Few ſhips can have their yards braced up to 37° 30′; and yet this is required in order to have an incidence of 56°, and to hold a courſe 94° 25′ from the apparent direction of the wind, that is, with the wind apparently 4° 25′ abaft the beam. A good ſailing ſhip in this poſition may acquire a velocity even exceeding that of the wind. Let us ſuppoſe it only one half of this velocity. We ſhall find that the angle WCw is in this caſe about 29°, and the ſhip is nearly going 123° from the wind, with the wind almoſt perpendicular to the ſail; therefore this utmoſt bracing up of the ſails is only giving them the poſition ſuited to a wind broad on the quarter. It is impoſſible therefore to comply with the demand of the mathematician, and the ſeaman muſt be contented to employ a leſs favourable diſpoſition of his ſails in all caſes where his courſe does not lie at leaſt eleven points from the wind.

Let us ſee whether this reſtriction, ariſing from neceſſity, leaves any thing in our choice, and makes one courſe preferable to another. We ſee that there are a prodigious number of courſes, and theſe the moſt uſual and the moſt important, which we muſt hold with one trim of the ſails; in particular, ſailing with the wind on the beam, and all caſes of plying to windward, muſt be performed with this unfavourable trim of the ſails. We are certain that the ſmaller we make the angle of incidence, real or apparent, the ſmaller will be the velocity of the ſhip; but it may happen that we ſhall gain more to windward, or get ſooner away from a lee-coaſt, or any object of danger, by ſailing ſlowly on one courſe than by ſailing quickly on another.

We have ſeen that while the trim of the ſails remains the ſame, the leeway and the angle of the yard and courſe remains the ſame, and that the velocity of the ſhip is as the ſine of the angle of real incidence, that is, as the ſine of the angle of the ſail and the real direction of the wind.

Fig. 8. Let the ſhip AB (fig. 8.) hold the courſe CF, with the wind blowing in the direction WC, and having her yards DCD braced up to the ſmalleſt angle BCD which the rigging can admit. Let CF be to CE as the velocity of the ſhip to the velocity of the wind; join FE and draw Cw parallel to EF; it is evident that FE is the relative motion of the wind, and wCD is the relative incidence on the ſail. Draw FO parallel to the yard DC, and deſcribe a circle through the points COF; then we ſay that if the ſhip, with the ſame wind and the ſame trim of the ſame drawing ſails, be made to ſail on any other courſe Cf, her velocity along CF is to the velocity along Cf as CF is to Cf; or, in other words, the ſhip will employ the ſame time in going from C to any point of the circumference CFO.

Join fO. Then, becauſe the angles CFO, cfO are on the ſame chord CO, they are equal, and fO is parallel to dCd, the new poſition of the yard correſponding to the new poſition of the keel ab, making the angle dCb=DCB. Alſo, by the nature of the circle, the line CF is to Cf as the ſine of the angle CFO to the ſine of the angle COf, that is (on account of the parallels CD, OF and Cd, Of), as the ſine of WCD to the ſine of WCd. But when the trim of the ſails remains the ſame, the velocity of the ſhip is as the ſine of the angle of the ſail with the direction of the wind; therefore CF is to Cf as the velocity on CF to that on Cf, and the propoſition is demonſtrated.

35 To determine the beſt courſe for avoiding a rock. Let it now be required to determine the beſt courſe for avoiding a rock R lying in the direction CR, or for withdrawing as faſt as poſſible from a line of coaſt PQ. Draw CM through R, or parallel to PQ, and let m be the middle of the arch CmM. It is plain that m is the moſt remote from CM of any point of the arch CmM, and therefore the ſhip will recede farther from the coaſt PQ in any given time by holding the courſe Cm than by any other courſe.

This courſe is eaſily determined; for the arch CmM =360° — (arch CO + arch OM), and the arch CO is the meaſure of twice the angle CFO, or twice the angle DCB, or twice $\overline{b+x}$, and the arch OM meaſures twice the angle ECM.

Thus, ſuppoſe the ſharpeſt poſſible trim of the ſails to be 33°, and the obſerved angle ECM to be 70°; then CO+OM is 70°+140° or 210°. This being taken from 360°, leaves 150°, of which the half Mm is 75°, and the angle MCm is 37° 30′. This added to ECM makes ECm 107° 30′, leaving WC m=72° 30′, and the ſhip muſt hold a courſe making an angle of 72° 30′ with the real direction of the wind, and WCD will be 37° 30′.

This ſuppoſes no leeway. But if we know that under all the ſail which the ſhip can carry with ſafety and advantage ſhe makes 5 degrees of leeway, the angle DCm of the ſail and courſe, or $b+x$, is 40°. Then CO+OM=220°, which being taken from 360° leaves 140°, of which the half is 70°, =Mm, and the angle MC m = 35°, and EC m = 105°, and WC m = 75°, and the ſhip muſt lie with her head 70° from the wind, making 5 degrees of leeway, and the angle WCD is 35°.

The general rule for the poſition of the ſhip is, *that the line on ſhipboard which biſects the angle* b+x *may alſo biſect the angle* WCM, or make the angle between the courſe and the line from which we wiſh to withdraw equal to the angle between the ſail and the real direction of the wind.

36 Corollaries. It is plain that this problem includes that of plying to windward. We have only to ſuppoſe ECM to be 90°; then, taking our example in the ſame ſhip, with the ſame trim and the ſame leeway, we have $b+x$=40°. This taken from 90° leaves 50° and WC n=90—25= 65, and the ſhip's head muſt lie 60° from the wind, and the yard muſt be 25° from it.

It muſt be obſerved here, that it is not always eligible to ſelect the courſe which will remove the ſhip faſteſt from the given line CM; it may be more prudent to remove from it more ſecurely though more ſlowly. In ſuch caſes the procedure is very ſimple, viz. to ſhape the courſe as near the wind as is poſſible.

The reader will alſo eaſily ſee that the propriety of theſe practices is confined to thoſe courſes only where the practicable trim of the ſails is not ſufficiently ſharp. Whenever the courſe lies ſo far from the wind that it is poſſible to make the tangent of the apparent angle of the wind and ſail double the tangent of the ſail and courſe, it ſhould be done.

37 The adjuſtment of the ſails ſuppoſed in the theory impracticable. Theſe are the chief practical conſequences which can be deduced from the theory. But we ſhould conſider how far this adjuſtment of the ſails and courſe can be performed. And here occur difficulties ſo great as to make it almoſt impracticable. We have always ſuppoſed the poſition of the ſurface of the ſail to be diſtinctly obſervable and meaſurable; but this can hardly be affirmed even with reſpect to a ſail ſtretched on a yard. Here we ſuppoſed the ſurface of the ſail to have the ſame inclination to the keel that the yard has. This is by no means the caſe; the ſail aſſumes a concave form, of which it is almoſt impoſſible to aſſign the direction of the mean impulſe. We believe that this is always conſiderably to leeward of a perpendicular to the yard, lying between CI and CE (fig. 6.). This is of ſome advantage, being equivalent to a ſharper trim. We cannot affirm this, however, with any confidence, becauſe it renders the impulſe on the weather-leech of the ſail ſo exceedingly feeble as hardly to have any effect. In ſailing cloſe to the wind the ſhip is kept ſo near that the weather-leech of the ſail is almoſt ready to receive the wind edgewiſe, and to flutter or ſhiver. The moſt effective or drawing ſails with a ſide-wind, eſpecially when

when plying to windward, are the ſtayſails. We believe that it is impoſſible to ſay, with any thing approaching to preciſion, what is the poſition of the general ſurface of a ſtayſail, or to calculate the intenſity and direction of the general impulſe; and we affirm with confidence that no man can pronounce on theſe points with any exactneſs. If we can gueſs within a third or a fourth part of the truth, it is all we can pretend to; and after all, it is but a gueſs. Add to this, the ſails coming in the way of each other, and either becalming them or ſending the wind upon them in a direction widely different from that of its free motion. All theſe points we think beyond our power of calculation, and therefore that it is in vain to give the ſeaman mathematical rules, or even tables of adjuſtment ready calculated; ſince he can neither produce that medium poſition of his ſails that is required, nor tell what is the poſition which he employs.

This is one of the principal reaſons why ſo little advantage has been derived from the very ingenious and promiſing diſquiſitions of Bouguer and other mathematicians, and has made us omit the actual ſolution of the chief problems, contenting ourſelves with pointing out the proceſs to ſuch readers as have a reliſh for theſe analytical operations.

38
The theory itſelf erroneous,

But there is another principal reaſon for the ſmall progreſs which has been made in the theory of ſeamanſhip: This is the error of the theory itſelf, which ſuppoſes the impulſions of a fluid to be in the duplicate ratio of the ſine of incidence. The moſt careful compariſon which has been made between the reſults of this theory and matter of fact is to be ſeen in the experiments made by the members of the Royal Academy of Sciences at Paris, mentioned in the article *RESISTANCE of Fluids*. We ſubjoin another abſtract of them in the following table; where col. 1ſt gives the angle of incidence; col. 2d gives the impulſions really obſerved; col. 3d the impulſes, had they followed the duplicate ratio of the ſines; and col. 4th the impulſes, if they were in the ſimple ratio of the ſines.

Angle	Impulſion obſerved	Impulſe as Sine ^{2}.	Impulſe as Sine.
90	1000	1000	1000
84	989	989	995
78	958	957	978
72	908	905	951
66	845	835	914
60	771	750	866
54	693	655	809
48	615	552	743
42	543	448	669
36	480	346	587
30	440	250	500
24	424	165	407
18	414	96	309
12	406	43	208
6	400	11	105

Here we ſee an enormous difference in the great obliquities. When the angle of incidence is only ſix degrees, the obſerved impulſe is forty times greater than the theoretical impulſe; at 12° it is ten times greater; at 18° it is more than four times greater; and at 24° it is almoſt three times greater.

39
and the deductions from it uſeleſs.

No wonder then that the deductions from this theory are ſo uſeleſs and ſo unlike what we familiarly obſerve. We took notice of this when we were conſidering the leeway of a rectangular box, and thus ſaw a reaſon for admitting an incomparably ſmaller leeway than what would reſult from the laborious computations neceſſary by the theory. This error in theory has as great an influence on the impulſions of air when acting obliquely on a ſail; and the experiments of Mr Robins and of the Chevalier Borda on the oblique impulſions of air are perfectly conformable (as far as they go) to thoſe of the academicians on water. The oblique impulſions of the wind are therefore much more efficacious for preſſing the ſhip in the direction of her courſe than the theory allows us to ſuppoſe; and the progreſs of a ſhip plying to windward is much greater, both becauſe the oblique impulſes of the wind are more effective, and becauſe the leeway is much ſmaller, than we ſuppoſe. Were not this the caſe, it would be impoſſible for a ſquare-rigged ſhip to get to windward. The impulſe on her ſails when cloſe hauled would be ſo trifling that ſhe would not have a third part of the velocity which we ſee her acquire: and this trifling velocity would be waſted in leeway; for we have ſeen that the diminution of the oblique impulſes of the water is accompanied by an increaſe of leeway. But we ſee that in the great obliquities the impulſions continue to be very conſiderable, and that even an incidence of ſix degrees gives an impulſe as great as the theory allows to an incidence of 40. We may therefore, on all occaſions, keep the yards more ſquare; and the loſs which we ſuſtain by the diminution of the very oblique impulſe will be more than compenſated by its more favourable direction with reſpect to the ſhip's keel. Let us take an example of this. Suppoſe the wind about two points before the beam, making an angle of 68° with the keel. The theory aſſigns 43° for the inclination of the wind to the ſail, and 15° for the trim of the ſail. The perpendicular impulſe being ſuppoſed 1000, the theoretical impulſe for 45° is 465. This reduced in the proportion of radius to the ſine of 25°, gives the impulſe in the direction of the courſe only 197.

But if we eaſe off the lee-braces till the yard makes an angle of 50° with the keel, and allows the wind an incidence of no more than 18°, we have the experimented impulſe 414, which, when reduced in the proportion of radius to the ſine of 50°, gives an effective impulſe 317. In like manner, the trim 56°, with the incidence 12°, gives an effective impulſe 337; and the trim 62°, with the incidence only 6°, gives 353.

Hence it would at firſt ſight appear that the angle DCB of 62° and WCD of 6° would be better for holding a courſe within ſix points of the wind than any more oblique poſition of the ſails; but it will only give a greater initial impulſe. As the ſhip accelerates, the wind apparently comes ahead, and we muſt continue to brace up as the ſhip freſhens her way. It is not unuſual for her to acquire half or two thirds of the velocity of the wind; in which caſe the wind comes apparently ahead more than two points, when the yards muſt be braced up to 35°, and this allows an impulſe no greater than about 7°. Now this is very frequently obſerved

observed in good ships, which in a brisk gale and smooth water will go five or six knots close hauled, the ship's head six points from the wind, and the sails no more than just full, but ready to shiver by the smallest puff. All this would be impossible by the usual theory; and in this respect these experiments of the French academy gave a fine illustration of the seaman's practice. They account for what we should otherwise be much puzzled to explain; and the great progress which is made by a ship close hauled being perfectly agreeable to what we should expect from the law of oblique impulsion deducible from these so often mentioned experiments, while it is totally incompatible with the common theory, should make us abandon the theory without hesitation, and strenuously set about the establishment of another, founded entirely on experiments. For this purpose the experiments should be made on the oblique impulsions of air on as great a scale as possible, and in as great a variety of circumstances, so as to furnish a series of impulsions for all angles of obliquity. We have but four or five experiments on this subject, *viz.* two by Mr Robins and two or three by the Chevalier Borda. Having thus gotten a series of impulsions, it is very practicable to raise on this foundation a practical institute, and to give a table of the velocities of a ship suited to every angle of inclination and of trim; for nothing is more certain than the resolution of the impulse perpendicular to the sail into a force in the direction of the keel, and a lateral force.

40 Experiments proper for establishing another

We are also disposed to think that experiments might be made on a model very nicely rigged with sails, and trimmed in every different degree, which would point out the mean direction of the impulse on the sails, and the comparative force of these impulses in different directions of the wind. The method would be very similar to that for examining the impulse of the water on the hull. If this can also be ascertained experimentally, the intelligent reader will easily see that the whole motion of a ship under sail may be determined for every case. Tables may then be constructed by calculation, or by graphical operations, which will give the velocities of a ship in every different course, and corresponding to every trim of sail. And let it be here observed, that the trim of the sail is not to be estimated in degrees of inclination of the yards; because, as we have already remarked, we cannot observe nor adjust the lateen sails in this way. But, in making the experiments for ascertaining the impulse, the exact position of the tacks and sheets of the sails are to be noted; and this combination of adjustments is to pass by the name of a certain trim. Thus that trim of all the sails may be called 40, whose direction is experimentally found equivalent to a flat surface trimmed to the obliquity 40°.

Having done this, we may construct a figure for each trim similar to fig. 8. where, instead of a circle, we shall have a curve C O M′ F′, whose chords CF′, *c f′*, &c. are proportional to the velocities in these courses; and by means of this curve we can find the point *m′*, which is most remote from any line CM from which we wish to withdraw: and thus we may solve all the principal problems of the art.

We hope that it will not be accounted presumption in us to expect more improvement from a theory founded on judicious experiments only, than from a theory of the impulse of fluids, which is found so inconsistent with observation, and of whose fallacy all its authors, from Newton to D'Alembert, entertained strong suspicions. Again, we beg leave to recommend this view of the subject to the attention of the SOCIETY FOR THE IMPROVEMENT OF NAVAL ARCHITECTURE. Should these patriotic gentlemen entertain a favourable opinion of the plan, and honour us with their correspondence, we will cheerfully impart to them our notions of the way in which both these trains of experiments may be prosecuted with success, and results obtained in which we may confide; and we content ourselves at present with offering to the public these hints, which are not the speculations of a man of mere science, but of one who, with a competent knowledge of the laws of mechanical nature, has the experience of several years service in the royal navy, where the art of working of ships was a favourite object of his scientific attention.

41 recommended to the Society for the Improvement of Naval Architecture.

With these observations we conclude our discussion of the first part of the seaman's task, and now proceed to consider the means that are employed to prevent or to produce any deviations from the uniform rectilineal course which has been selected.

42 Means employed to prevent or produce deviations from a course.

Here the ship is to be considered as a body in free space, convertible round her centre of inertia. For whatever may be the point round which she turns, this motion may always be considered as compounded of a rotation round an axis passing through her centre of gravity or inertia. She is impelled by the wind and by the water acting on many surfaces differently inclined to each other, and the impulse on each is perpendicular to the surface. In order therefore that she may continue steadily in one course, it is not only necessary that the impelling forces, estimated in their mean direction, be equal and opposite to the resisting forces estimated in their mean direction; but also that these two directions may pass through one point, otherwise she will be affected as a log of wood is when pushed in opposite directions by two forces, which are equal indeed, but are applied to different parts of the log. A ship must be considered as a lever, acted on in different parts by forces in different directions, and the whole balancing each other round that point or axis where the equivalent of all the resisting forces passes. This may be considered as a point supported by this resisting force and as a sort of fulcrum: therefore, in order that the ship may maintain her position, the energies or *momenta* of all the impelling forces round this point must balance each other.

43 Impulses on a ship sailing right before the wind different from those on her when sailing obliquely.

When a ship sails right afore the wind, with her yards square, it is evident that the impulses on each side of the keel are equal, as also their mechanical *momenta* round any axis passing perpendicularly through the keel. So are the actions of the water on her bows. But when she sails on an oblique course, with her yards braced up on either side, she sustains a pressure in the direction CI (fig. 5.) perpendicular to the sail. This, by giving her a lateral pressure LI, as well as a pressure CL ahead, causes her to make leeway, and to move in a line C *b* inclined to CB. By this means the balance of action on the two bows is destroyed; the general impulse on the lee-bow is increased; and that on the weather-bow is diminished.

miniſhed. The combined impulſe is therefore no longer in the direction BC, but (in the ſtate of uniform motion) in the direction IC.

Suppoſe that in an inſtant the whole ſails are annihilated and the impelling preſſure CI, which preciſely balanced the reſiſting preſſure on the bows, removed. The ſhip tends, by her inertia, to proceed in the direction C*b*. This tendency produces a continuation of the reſiſtance in the oppoſite direction IC, which is not directly oppoſed to the tendency of the ſhip in the direction C*b*; therefore the ſhip's head would immediately come up to the wind. The experienced ſeamen will recollect ſomething like this when the ſails are ſuddenly lowered when coming to anchor. It does not happen ſolely from the obliquity of the action on the bows: It would happen to the parallelopiped of fig. 2. which was ſuſtaining a lateral impulſion $B \cdot \text{fin.}^2 x$, and a direct impulſion $A \cdot \text{cof.}^2 x$. Theſe are continued for a moment after the annihilation of the ſail: but being no longer oppoſed by a force in the direction CD, but by a force in the direction C*b*, the force $B \cdot \text{fin.}^2 x$ muſt prevail, and the body is not only retarded in its motion, but its head turns towards the wind. But this effect of the leeway is greatly increaſed by the curved form of the ſhip's bows. This occaſions the centre of effort of all the impulſions of the water on the leeſide of the ſhip to be very far forward, and this ſo much the more remarkably as ſhe is ſharper afore. It is in general not much abaft the foremaſt. Now the centre of the ſhip's tendency to continue her motion is the ſame with her centre of gravity, and this is generally but a little before the mainmaſt. She is therefore in the ſame condition nearly as if ſhe were puſhed at the mainmaſt in a direction parallel to C*b*, and at the foremaſt by a force parallel to IC. The evident conſequence of this is a tendency to come up to the wind. This is independent of all ſituation of the ſails, provided only that they have been trimmed obliquely.

44 Griping. This tendency of the ſhip's head to windward is called GRIPING in the ſeaman's language, and is greateſt in ſhips which are ſharp forward, as we have ſaid already. This circumſtance is eaſily underſtood. Whatever is the direction of the ſhip's motion, the abſolute impulſe on that part of the bow immediately contiguous to B is perpendicular to that very part of the ſurface. The more acute, therefore, that the angle of the bow is, the more will the impulſe on that part be perpendicular to the keel, and the greater will be its energy to turn the head to windward.

45 Propriety of the diſpoſition of the ſails of a ſhip. Thus we are enabled to underſtand or to ſee the propriety of the diſpoſition of the ſails of a ſhip. We ſee her crowded with ſails forward, and even many ſails extended far before her bow, ſuch as the ſpritſail, the bowſprit-topſail, the fore-topmaſt ſtayſail, the jib, and flying jib. The ſails abaft are comparatively ſmaller. The ſails on the mizenmaſt are much ſmaller than thoſe on the foremaſt. All the ſtayſails hoiſted on the mainmaſt may be conſidered as headſails, becauſe their centres of effort are conſiderably before the centre of gravity of the ſhip: and notwithſtanding this diſpoſition, it generally requires a ſmall action of the rudder to counteract the windward tendency of the lee-bow. This is conſidered as a good quality when moderate; becauſe it enables the ſeaman to throw the ſails aback, and ſtop the ſhip's way in a moment, if ſhe be in danger from any thing a-head; and the ſhip which does not carry a little of a weather helm, is always a dull ſailer.

46 Action of the water and the ſails. In order to judge ſomewhat more accurately of the action of the water and ſails, ſuppoſe the ſhip AB (fig. 9.) to have its ſails on the mizenmaſt D, the mainmaſt E, and foremaſt F, braced up or trimmed alike, and that the three lines D*i*, E*e*, F*f*, perpendicular to the ſails, are in the proportion of the impulſes on the ſails. The ſhip is driven a-head and to leeward, and moves in the path *a* C *b*. This path is ſo inclined to the line of the keel that the medium direction of the reſiſtance of the water is parallel to the direction of the impulſe. A line CI may be drawn parallel to the lines D*i*, E*e*, F*f*, and equal to their ſum: and it may be drawn from ſuch a point C, that the actions on all the parts of the hull between C and B may balance the *momenta* of all the actions on the hull between C and A. Fig. 9.

47 Centre of effort This point may juſtly be called the *centre of effort*, or the *centre of reſiſtance*. We cannot determine this point for want of a proper theory of the reſiſtance of fluids. Nay, although experiments like thoſe of the Pariſian academy ſhould give us the moſt perfect knowledge of the intenſity of the oblique impulſes on a ſquare foot, we ſhould hardly be benefited by them: for the action of the water on a ſquare foot of the hull at *p*, for inſtance, is ſo modified by the intervention of the ſtream of water which has ſtruck the hull about B, and glided along the bow B *o p*, that the preſſure on *p* is totally different from what it would have been were it a ſquare foot or ſurface detached from the reſt, and preſented in the ſame poſition to the water moving in the direction *b* C. For it is found, that the reſiſtances given to planes joined ſo as to form a wedge, or to curved ſurfaces, are widely different from the accumulated reſiſtances, calculated for their ſeparate parts, agreeably to the experiments of the academy on ſingle ſurfaces. We therefore do not attempt to aſcertain the point C by theory; but it may be accurately determined by the experiments which we have ſo ſtrongly recommended; and we offer this as an additional inducement for proſecuting them.

48 To be determined by experiments. Draw through C a line perpendicular to CI, that is, parallel to the ſails; and let the lines of impulſe of the three ſails cut it in the points *i*, *k*, and *m*. This line *i m* may be conſidered as a lever, moveable round C, and acted on at the points *i*, *k*, and *m*, by three forces. The rotatory momentum of the ſails on the mizenmaſt is $D i \times i C$; that of the ſails on the mainmaſt is $E e \times k C$; and the momentum of the ſails on the foremaſt is $F f \times m C$. The two firſt tend to preſs forward the arm C*i*, and then to turn the ſhip's head towards the wind. The action of the ſails on the foremaſt tends to pull the arm C*m* forward, and produce a contrary rotation. If the ſhip under theſe three ſails keeps ſteadily in her courſe, without the aid of the rudder, we muſt have $D i \times i C + E e \times k C = F f \times m C$. This is very poſſible, and is often ſeen in a ſhip under her mizen-topſail, main-topſail, and fore-topſail, all parallel to one another, and their ſurfaces duly proportioned by reefing. If more ſails are ſet, we muſt always have a ſimilar equilibrium. A certain number of them will have their efforts directed from the larboard arm of the lever *i m* lying to leeward of CI, and a certain number will have their efforts directed from the ſtarboard arm lying to windward of CI. The ſum of the products of each of the firſt ſet, by their diſtances from C, muſt be

49 Equilibrium preſerved by the poſition of the ſails. equal

equal to the ſum of the ſimilar products of the other ſet. As this equilibrium is all that is neceſſary for preſerving the ſhip's poſition, and the ceſſation of it is immediately followed by a converſion; and as theſe ſtates of the ſhip may be had by means of the three ſquare ſails only, when their ſurfaces are properly proportioned—it is plain that every movement may be executed and explained by their means. This will greatly ſimplify our future diſcuſſions. We ſhall therefore ſuppoſe in future that there are only the three topſails ſet, and that their ſurfaces are ſo adjuſted by reefing, that their actions exactly balance each other round that point C of the middle line AB, where the actions of the water on the different parts of her bottom in like manner balance each other. This point C may be differently ſituated in the ſhip according to the leeway ſhe makes, depending on the trim of the ſails; and therefore although a certain proportion of the three ſurfaces may balance each other in one ſtate of leeway, they may happen not to do ſo in another ſtate. But the equilibrium is evidently attainable in every caſe, and we therefore ſhall always ſuppoſe it.

50 Conſequence of deſtroying it.

It muſt now be obſerved, that when this equilibrium is deſtroyed, as, for example, by turning the edge of the mizen-topſail to the wind, which the ſeamen call *ſhivering* the mizen-topſail, and which may be conſidered as equivalent to the removing the mizen-topſail entirely, it does not follow that the ſhip will round the point C, this point remaining fixed. The ſhip muſt be conſidered as a free body, ſtill acted on by a number of forces, which no longer balance each other; and ſhe muſt therefore *begin* to turn round a ſpontaneous axis of converſion, which muſt be determined in the way ſet forth in the article ROTATION. It is of importance to point out in general where this axis is ſituated. Therefore let G (fig. 10.) be the centre of gravity of the ſhip. Draw the line q G v parallel to the yards, cutting D d in q, E e in r, CI in t, and F f in v. While the three ſails are ſet, the line $q\,v$ may be conſidered as a lever acted on by four forces, *viz.* D d, impelling the lever forward perpendicularly in the point q; E e, impelling it forward in the point r; F f, impelling it forward in the point v; and CI, impelling it backward in the point t. Theſe forces balance each other both in reſpect of progreſſive motion and of rotatory energy: for CI was taken equal to the ſum of D d, E e, and F f; ſo that no acceleration or retardation of the ſhip's progreſs in her courſe is ſuppoſed.

Fig. 10.

But by taking away the mizen-topſail, both the equilibriums are deſtroyed. A part D d of the accelerating force is taken away; and yet the ſhip, by her inertia or inherent force, tends, for a moment, to proceed in the direction C p with her former velocity; and by this tendency exerts for a moment the ſame preſſure CI on the water, and ſuſtains the ſame reſiſtance IC. She muſt therefore be retarded in her motion by the exceſs of the reſiſtance IC over the remaining impelling forces E e and F f, that is, by a force equal and oppoſite to D d. She will therefore be retarded in the ſame manner as if the mizen-topſail were ſtill ſet, and a force equal and oppoſite to its action were applied to G the centre of gravity, and ſhe would ſoon acquire a ſmaller velocity, which would again bring all things into equilibrium; and ſhe would ſtand on in the ſame courſe, without changing either her leeway or the poſition of her head.

But the equilibrium of the lever is alſo deſtroyed. It is now acted on by three forces only, *viz.* E e and F f, impelling it forward in the points r and v, and IC impelling it backward in the point t. Make $r\,v : r\,o =$ E e + F f : F f, and make $o\,p$ parallel to CI and equal to E e = F f. Then we know, from the common principles of mechanics, that the force $o\,p$ acting at o will have the ſame momentum or energy to turn the lever round *any* point whatever as the two forces E e and F f applied at r and v; and now the lever is acted on by two forces, *viz.* IC, urging it backwards in the point t, and $o\,p$ urging it forwards in the point o. It muſt therefore turn round like a floating log, which gets two blows in oppoſite directions. If we now make IC—$o\,p$: $o\,p = t\,o : t\,x$, or IC—$o\,p$: IC = $t\,o : o\,x$, and apply to the point x a force equal to IC—$o\,p$ in the direction IC; we know by the common principles of mechanics, that this force IC—$o\,p$ will produce the ſame rotation round any point as the two forces IC and $o\,p$ applied in their proper directions at t and o. Let us examine the ſituation of the point x.

The force IC—$o\,p$ is evidently = D d, and $o\,p$ is = E e + F f. Therefore $o\,t : t\,x =$ D $d : o\,p$. But becauſe, when all the ſails were filled, there was an equilibrium round C, and therefore round t, and becauſe the force $o\,p$ acting at o is equivalent to E e and F f acting at r and v, we muſt ſtill have the equilibrium; and therefore we have the momentum D $d \times q\,t = o\,p \times o\,t$. Therefore $o\,t : t\,q =$ D $d : o\,p$, and $t\,q = t\,x$. Therefore the point x is the ſame with the point q.

51 By ſhivering the mizen-topſail.

Therefore, when we ſhiver the mizen-topſail, the rotation of the ſhip is the ſame as if the ſhip were at reſt, and a force equal and oppoſite to the action of the mizen-topſail were applied at q or at D, or at any point in the line D q.

This might have been ſhown in another and ſhorter way. Suppoſe all ſails filled, the ſhip is in equilibrio. This will be diſturbed by applying to D a force oppoſite to D d; and if the force be alſo equal to D d, it is evident that theſe two forces deſtroy each other, and that this application of the force dD is equivalent to the taking away of the mizen-topſail. But we choſe to give the whole mechanical inveſtigation; becauſe it gave us an opportunity of pointing out to the reader, in a caſe of very eaſy comprehenſion, the preciſe manner in which the ſhip is acted on by the different ſails and by the water, and what ſhare each of them has in the motion ultimately produced. We ſhall not repeat this manner of procedure in other caſes, becauſe a little reflection on the part of the reader will now enable him to trace the *modus operandi* through all its ſteps.

We now ſee that, in reſpect both of progreſſive motion and of converſion, the ſhip is affected by ſhivering the ſail D, in the ſame manner as if a force equal and oppoſite to D d were applied at D, or at any point in the line D d. We muſt now have recourſe to the principles eſtabliſhed under the article ROTATION.

Let p repreſent a particle of matter, r its radius vector, or its diſtance pG from an axis paſſing through the centre of gravity G, and let M repreſent the whole quantity of matter of the ſhip. Then its momentum of inertia is $= \int p \cdot r$ (ſee ROTATION, N° 18.) The ſhip, impelled in the point D by a force in the direction dD, will begin to turn round a ſpontaneous vertical axis, paſſing through a point S of the line qG,

which

which is drawn through the centre of gravity G, perpendicular to the direction dD of the external force, and the distance GS of this axis from the centre of gravity is $= \frac{\int p \cdot r^2}{M \cdot G q}$ (see ROTATION, N° 96.), and it is taken on the opposite side of G from q, that is, S and q are on opposite sides of G.

Let us express the external force by the symbol F. It is equivalent to a certain number of pounds, being the pressure of the wind moving with the velocity V and inclination a on the surface of the sail D; and may therefore be computed either by the theoretical or experimental law of oblique impulses. Having obtained this, we can ascertain the angular velocity of the rotation and the absolute velocity of any given point of the ship by means of the theorems established in the article ROTATION.

52 Action of the rudder. But before we proceed to this investigation, we shall consider the action of the rudder, which operates precisely in the same manner. Let the ship AB (fig. 11.) have her rudder in the position AD, the helm being hard a-starboard, while the ship sailing on the starboard tack, and making leeway, keeps on the course $a b$. The lee surface of the rudder meets the water obliquely. The very foot of the rudder meets it in the direction DE parallel to $a b$. The parts farther up meet it with various obliquities, and with various velocities, as it glides round the bottom of the ship and falls into the wake. It is absolutely impossible to calculate the accumulated impulse. We shall not be far mistaken in the deflection of each contiguous filament, as it quits the bottom and glides along the rudder; but we neither know the velocity of these filaments, nor the deflection and velocity of the filaments gliding without them. We therefore imagine that all computations on this subject are in vain. But it is enough for our purpose that we know the direction of the absolute pressure which they exert on its surface. It is in the direction D d, perpendicular to that surface. We also may be confident that this pressure is very considerable, in proportion to the action of the water on the ship's bows, or of the wind on the sails; and we may suppose it to be nearly in the proportion of the square of the velocity of the ship in her course; but we cannot affirm it to be accurately in that proportion, for reasons that will readily occur to one who considers the way in which the water falls in behind the ship.

Fig. 11.

53 Greatest in a fine sailer. It is observed, however, that a fine sailer always steers well, and that all movements by means of the rudder are performed with great rapidity when the velocity of the ship is great. We shall see by and by, that the speed with which the ship performs the angular movements is in the proportion of her progressive velocity: For we shall see that the squares of the times of performing the evolution are as the impulses inversely, which are as the squares of the velocities. There is perhaps no force which acts on a ship that can be more accurately determined by experiment than this. Let the ship ride in a stream or tideway whose velocity is accurately measured; and let her ride from two moorings, so that her bow may be a fixed point. Let a small tow-line be laid out from her stern or quarter at right angles to the keel, and connected with some apparatus fitted up on shore or on board another ship, by which the strain on it may be accurately measured; a person conversant with mechanics will see many ways in which this can be done. Perhaps the following may be as good as any: Let the end of the tow-line be fixed to some point as high out of the water as the point of the ship from which it is given out, and let this be very high. Let a block with a hook be on the rope, and a considerable weight hung on this hook. Things being thus prepared, put down the helm to a certain angle, so as to cause the ship to sheer off from the point to which the far end of the tow-line is attached. This will stretch the rope, and raise the weight out of the water. Now heave upon the rope, to bring the ship back again to her former position, with her keel in the direction of the stream. When this position is attained, note carefully the form of the rope, that is, the angle which its two parts make with the horizon. Call this angle a. Every person acquainted with these subjects knows that the horizontal strain is equal to half the weight multiplied by the cotangent of a, or that 2 is to the cotangent of a as the weight to the horizontal strain. Now it is this strain which balances and therefore measures the action of the rudder, or D e in fig. 11. Therefore, to have the absolute impulse D d, we must increase D e in the proportion of radius to the secant of the angle b which the rudder makes with the keel. In a great ship sailing six miles in an hour, the impulse on the rudder inclined 30° to the keel is not less than 3000 pounds. The surface of the rudder of such a ship contains near 80 square feet. It is not, however, very necessary to know this absolute impulse D d, because it is its part D e alone which measures the energy of the rudder in producing a conversion. Such experiments, made with various positions of the rudder, will give its energies corresponding to these positions, and will settle that long disputed point, which is the best position for turning a ship. On the hypothesis that the impulsions of fluids are in the duplicate ratio of the sines of incidence, there can be no doubt that it should make an angle of 54° 44′ with the keel. But the form of a large ship will not admit of this, because a tiller of a length sufficient for managing the rudder in sailing with great velocity has not room to deviate above 30° from the direction of the keel; and in this position of the rudder the mean obliquity of the filaments of water to its surface cannot exceed 40° or 45°. A greater angle would not be of much service, for it is never for want of a proper obliquity that the rudder fails of producing a conversion.

54 How to determine it.

A ship misses stays in rough weather for want of a sufficient progressive velocity, and because her bows are beat off by the waves: and there is seldom any difficulty in wearing the ship, if she has any progressive motion. It is, however, always desirable to give the rudder as much influence as possible. Its surface should be enlarged (especially below) as much as can be done consistently with its strength and with the power of the steersmen to manage it; and it should be put in the most favourable situation for the water to get at it with great velocity; and it should be placed as far from the axis of the ship's motion as possible. These points are obtained by making the stern-post very upright, as has always been done in the French dockyards. The British ships have a much greater rake; but our builders are gradually adopting the French forms, experience having

55 Why a ship misses stays, &c.

ving taught us that their ſhips, when in our poſſeſſion, are much more obedient to the helm than our own.—In order to aſcertain the motion produced by the action of the rudder, draw from the centre of gravity a line G q perpendicular to D d (D d being drawn through the centre of effort of the rudder). Then, as in the conſideration of the action of the ſails, we may conceive the line q G as a lever connected with the ſhip, and impelled by a force D d acting perpendicularly at q. The conſequence of this will be, an incipient converſion of the ſhip about a vertical axis paſſing through ſome point S in the line q G, lying on the other ſide of G from q; and we have, as in the former caſe, GS $= \frac{\int p \cdot r^2}{M \cdot G q}$.

56 The action of the rudder ſimilar to that of the ſails, and very great.

Thus the action and effects of the ſails and of the rudder are perfectly ſimilar, and are to be conſidered in the ſame manner. We ſee that the action of the rudder, though of a ſmall ſurface in compariſon of the ſails, muſt be very great: For the impulſe of water is many hundred times greater than that of the wind; and the arm q G of the lever, by which it acts, is incomparably greater than that by which any of the impulſions on the ſails produces its effect; accordingly the ſhip yields much more rapidly to its action than ſhe does to the lateral impulſe of a ſail.

Obſerve here, that if G were a fixed or ſupported axis, it would be the ſame thing whether the abſolute force D d of the rudder acts in the direction D d, or its tranſverſe part D e acts in the direction D e, both would produce the ſame rotation; but it is not ſo in a free body. The force D d both tends to retard the ſhip's motion and to produce a rotation: It retards it as much as if the ſame force D d had been immediately applied to the centre. And thus the real motion of the ſhip is compounded of a motion of the centre in a direction parallel to D d, and of a motion round the centre. Theſe two conſtitute the motion round S.

57 Employed as an example of the motions of converſion.

As the effects of the action of the rudder are both more remarkable and ſomewhat more ſimple than thoſe of the ſails, we ſhall employ them as an example of the mechaniſm of the motions of converſion in general; and as we muſt content ourſelves in a work like this with what is very general, we ſhall ſimplify the inveſtigation by attending only to the motion of converſion. We can get an accurate notion of the whole motion, if wanted for any purpoſe, by combining the progreſſive or retrograde motion parallel to D d with the motion of rotation which we are about to determine.

In this caſe, then, we obſerve, in the firſt place, that the angular velocity (ſee ROTATION, N° 22.) is $\frac{D h \cdot q G}{\int p r^2}$; and, as was ſhown in that article, this velocity of rotation increaſes in the proportion of the time of the forces uniform action, and the rotation would be uniformly accelerated if the forces did really act uniformly. This, however, cannot be the caſe, becauſe, by the ſhip's change of poſition and change of progreſſive velocity, the direction and intenſity of the impelling force is continually changing. But if two ſhips are performing ſimilar evolutions, it is obvious that the changes of force are ſimilar in ſimilar parts of the evolution. Therefore the conſideration of the momentary evolution is ſufficient for enabling us to compare the motions of ſhips actuated by ſimilar forces, which is all we have in view at preſent. The velocity v, generated in any time t by the continuance of an invariable momentary acceleration (which is all that we mean by ſaying that it is produced by the action of a conſtant accelerating force), is as the acceleration and the time jointly. Now what we call the *angular velocity* is nothing but this momentary acceleration. Therefore the velocity v generated in the time t is $= \frac{F \cdot q G}{\int p r^2} t$.

58 Angular velocity.

The expreſſion of the angular velocity is alſo the expreſſion of the velocity v of a point ſituated at the diſtance 1 from the axis G.

Let z be the ſpace or arch of revolution deſcribed in the time t by this point, whoſe diſtance from G is $= 1$. Then $\dot{z} = v \dot{t} = \frac{F \cdot q G}{\int p r^2} t \dot{t}$, and taking the fluent $z = \frac{F \cdot q G}{\int p r^2} t^2$. This arch meaſures the whole angle of rotation accompliſhed in the time t. Theſe are therefore as the ſquares of the times from the beginning of the rotation.

Thoſe evolutions are equal which are meaſured by equal arches. Thus two motions of 45 degrees each are equal. Therefore becauſe z is the ſame in both, the quantity $\frac{F \cdot q G}{\int p r} t^2$ is a conſtant quantity, and t^2 is reciprocally proportional to $\frac{F \cdot q G}{\int p r^2}$, or is proportional to $\frac{\int p r^2}{F \cdot q G}$, and t is proportional to $\frac{\sqrt{\int p r^2}}{\sqrt{F \cdot q G}}$. That is to ſay, the times of the ſimilar evolutions of two ſhips are as the ſquare root of the momentum of inertia directly, and as the ſquare root of the momentum of the rudder or ſail inverſely. This will enable us to make the compariſon eaſily. Let us ſuppoſe the ſhips perfectly ſimilar in form and rigging, and to differ only in length L and l; $\int P \cdot R^2$ is to $\int p r^2$ as L^5 to l^5. For the ſimilar particles P and p contain quantities of matter which are as the cubes of their lineal dimenſions, that is, as L^3 to l^3. And becauſe the particles are ſimilarly ſituated, R^2 is to r^2 as L^2 to l^2. Therefore $P \cdot R^2 : p \cdot r^2 = L^5 : l^5$. Now F is to f as L^2 to l^2. For the ſurfaces of the ſimilar rudders or ſails are as the ſquares of their lineal dimenſions, that is, as L^2 to l^2. And, laſtly, G q is to $g q$ as L to l, and therefore $F \cdot G q : f \cdot g q = L^3 : l^3$. Therefore we have $T^2 : t^2 = \frac{\int P \cdot R^2}{F \cdot G q_1} : \frac{\int p \cdot r^2}{f \cdot g q} = \frac{L^5}{L^3} : \frac{l^5}{l^3} = L^2 : l^2$, and $T : t = L : l$.

59 Times of ſimilar evolutions with ſimilar ſhips.

Therefore the times of performing ſimilar evolutions with ſimilar ſhips are proportional to the lengths of the ſhips when both are ſailing equally faſt; and ſince the evolutions are ſimilar, and the forces vary ſimilarly in their

their different parts, what is here demonſtrated of the ſmalleſt incipient evolutions is true of the whole. They therefore not only deſcribe equal angles of revolution, but alſo ſimilar curves.

A ſmall ſhip, therefore, works in leſs time and in leſs room than a great ſhip, and this in the proportion of its length. This is a great advantage in all caſes, particularly in wearing, in order to ſail on the other tack cloſe-hauled. In this caſe ſhe will always be to windward and a-head of the large ſhip, when both are got on the other tack. It would appear at firſt ſight that the large ſhip will have the advantage in tacking. Indeed the large ſhip is farther to windward when again trimmed on the other tack than the ſmall ſhip when ſhe is juſt trimmed on the other tack. But this happened before the large ſhip had completed her evolution, and the ſmall ſhip, in the mean time, has been going forward on the other tack, and going to windward. She will therefore be before the large ſhip's beam, and perhaps as far to windward.

We have ſeen that the velocity of rotation is proportional, *cæteris paribus*, to $F \times G\,q$. F means the abſolute impulſe on the rudder or ſail, and is always perpendicular to its ſurface. This abſolute impulſe on a ſail depends on the obliquity of the wind to its ſurface. The uſual theory ſays, that it is as the ſquare of the ſine of incidence: but we find this not true. We muſt content ourſelves with expreſſing it by ſome as yet unknown function φ of the angle of incidence a, and call it φa; and if S be the ſurface of the ſail, and V the velocity of the wind, the abſolute impulſe is $n V^2 S \times \varphi a$. This acts (in the caſe of the mizen-topſail, fig. 10.) by the lever q G, which is equal to $DG \times \text{cof. } DG\,q$, and $DG\,q$ is equal to the angle of the yard and keel; which angle we formerly called b. Therefore its energy in producing a rotation is $n V^2 S \times \varphi a \times DG \times \text{cof. } b$. Leaving out the conſtant quantities n, V^2, S, and DG, its energy is proportional to $\varphi a \times \text{cof. } b$. In order, therefore, that any ſail may have the greateſt power to produce a rotation round G, it muſt be ſo trimmed that $\varphi a \times \text{cof. } b$ may be a maximum. Thus, if we would trim the ſails on the foremaſt, ſo as to pay the ſhip off from the wind right a-head with the greateſt effect, and if we take the experiments of the French academicians as proper meaſures of the oblique impulſes of the wind on the ſail, we will brace up the yard to an angle of 48 degrees with the keel. The impulſe corresponding to 48 is 615, and the coſine of 48° is 669. Theſe give a product of 411435. If we brace the ſail to 54.44, the angle aſſigned by the theory, the effective impulſe is 405274. If we make the angle 45°, the impulſe is 408774. It appears then that 48° is preferable to either of the others. But the difference is inconſiderable, as in all caſes of maximum a ſmall deviation from the beſt poſition is not very detrimental. But the difference between the theory and this experimental meaſure will be very great when the impulſes of the wind are of neceſſity very oblique. Thus, in tacking ſhip, as ſoon as the headſails are taken aback, they ſerve to aid the evolution, as is evident: But if we were now to adopt the maxim inculcated by the theory, we ſhould immediately round in the weather-braces, ſo as to increaſe the impulſe on the ſail, becauſe it is then very ſmall; and although we by this means make yard more ſquare, and therefore diminiſh the rotatory momentum of this impulſe, yet the impulſe is more increaſed (by the theory) than its vertical lever is diminiſhed.— Let us examine this a little more particularly, becauſe it is reckoned one of the niceſt points of ſeamanſhip to aid the ſhip's coming round by means of the headſails; and experienced ſeamen differ in their practice in this manœuvre. Suppoſe the yard braced up to 40°, which is as much as can be uſually done, and that the ſail ſhivers (the bowlines are uſually let go when the helm is put down), the ſail immediately takes aback, and in a moment we may ſuppoſe an incidence of 6 degrees. The impulſe correſponding to this is 400 (by experiment), and the coſine of 40° is 766. This gives 306400 for the effective impulſe. To proceed according to the theory, we ſhould brace the yard to 70°, which would give the wind (now 34° on the weather-bow) an incidence of nearly 36°, and the ſail an inclination of 20° to the intended motion, which is perpendicular to the keel. For the tangent of 20° is about $\frac{1}{2}$ of the tangent of 36°. Let us now ſee what effective impulſe the experimental law of oblique impulſions will give for this adjuſtment of the ſails. The experimental impulſe for 36° is 480; the coſine of 70° is 342; the product is 164160, not much exceeding the half of the former. Nay, the impulſe for 36°, calculated by the theory, would have been only 346, and the effective impulſe only 118332. And it muſt be farther obſerved, that this theoretical adjuſtment would tend greatly to check the evolution, and in moſt caſes would entirely mar it, by checking the ſhip's motion a-head, and conſequently the action of the rudder, which is the moſt powerful agent in the evolution; for here would be a great impulſe directed almoſt aſtern.

60 A nice point of ſeamanſhip.

We were juſtifiable, therefore, in ſaying, in the beginning of this article, that a ſeaman would frequently find himſelf baffled if he were to work a ſhip according to the rules deduced from M. Bouguer's work; and we ſee by this inſtance of what importance it is to have the oblique impulſions of fluids aſcertained experimentally. The practice of the moſt experienced ſeaman is directly the oppoſite to this theoretical maxim, and its ſucceſs greatly confirms the uſefulneſs of theſe experiments of the academicians ſo often praiſed by us.

We return again to the general conſideration of the rotatory motion. We found the velocity $v = \frac{F \cdot q\,G}{\int p\, r^2}$.

It is therefore proportional, *cæteris paribus*, to q G. We have ſeen in what manner q G depends on the poſition and ſituation of the ſail or rudder when the point G is fixed. But it alſo depends on the poſition of G. With reſpect to the action of the rudder, it is evident that it is ſo much the more powerful as it is more remote from G. The diſtance from G may be increaſed either by moving the rudder farther aft or G farther forward. And as it is of the utmoſt importance that a ſhip anſwer her helm with the greateſt promptitude, thoſe circumſtances have been attended to which diſtinguiſhed fine ſteering ſhips from ſuch as had not this quality; and it is in a great meaſure to be aſcribed to this, that, in the gradual improvement of naval architecture, the centre of gravity has been placed far forward. Perhaps the notion of a centre of gravity did not come into the thoughts of the rude builders in early times; but they obſerved that thoſe boats and ſhips ſteered beſt which had

had their extreme breadth before the middle point, and conſequently the bows not ſo acute as the ſtern. This is ſo contrary to what one would expect, that it attracted attention more forcibly; and, being ſomewhat myſterious, it might prompt to attempts of improvement, by exceeding in this ſingular maxim. We believe that it has been carried as far as is compatible with other eſſential requiſites in a ſhip.

61 Of importance to determine the beſt place for a ſhip's centre of gravity.

We believe that this is the chief circumſtance in what is called the trim of a ſhip; and it were greatly to be wiſhed that the beſt place for the centre of gravity could be accurately aſcertained. A practice prevails, which is the oppoſite of what we are now advancing. It is uſual to load a ſhip ſo that her keel is not horizontal, but lower abaft. This is found to improve her ſteerage. The reaſon of this is obvious. It increaſes the acting ſurface of the rudder, and allows the water to come at it with much greater freedom and regularity; and it generally diminiſhes the griping of the ſhip forward, by removing a part of the bows out of the water. It has not always this effect; for the form of the harping aloft is frequently ſuch, that the tendency to gripe is diminiſhed by immerſing more of the bow in the water.

But waving theſe circumſtances, and attending only to the rotatory energy of the rudder, we ſee that it is of advantage to carry the centre of gravity forward. The ſame advantage is gained to the action of the after ſails. But, on the other hand, the action of the headſails is diminiſhed by it; and we may call every ſail a headſail whoſe centre of gravity is before the centre of gravity of the ſhip; that is, all the ſails hoiſted on the bowſprit and foremaſt, and the ſtayſails hoiſted on the mainmaſt; for the centre of gravity is ſeldom far before the mainmaſt.

Suppoſe that when the rudder is put into the poſition AD (fig. 11.), the centre of gravity could be ſhifted to g, ſo as to increaſe q G, and that this is done without increaſing the ſum of the products $p r^2$. It is obvious that the velocity of converſion will be increaſed in the proportion of q G to $q g$. This is very poſſible, by bringing to that ſide of the ſhip parts of her loading which were ſituated at a diſtance from G on the other ſide. Nay, we can make this change in ſuch a manner that $\int p r^2$ ſhall even be leſs than it was before, by taking care that every thing which we ſhift ſhall be nearer to g than it was formerly to G. Suppoſe it all placed in one ſpot m, and that m is the quantity of matter ſo ſhifted, while M is the quantity of matter in the whole ſhip. It is only neceſſary that $m \cdot g\,G^2$ ſhall be leſs than the ſum of the products $p r^2$ correſponding to the matter which has been ſhifted. Now, although the matter which is eaſily moveable is generally very ſmall in compariſon to the whole matter of the ſhip, and therefore can make but a ſmall change in the place of the centre of gravity, it may frequently be brought from places ſo remote that it may occaſion a very ſenſible diminution of the quantity $\int p r^2$, which expreſſes the whole momentum of inertia.

62 A practice of ſeamen in putting about explained.

This explains a practice of the ſeamen in ſmall wherries or ſkiffs, who in putting about are accuſtomed to place themſelves to leeward of the maſt. They even find that they can aid the quick motions of theſe light boats by the way in which they reſt on their two feet, ſometimes leaning all on one foot, and ſometimes on the other. And we have often ſeen this evolution very ſenſibly accelerated in a ſhip of war, by the crew running ſuddenly, as the helm is put down, to the lee-bow. And we have heard it aſſerted by very expert ſeamen, that after all attempts to wear ſhip (after lying-to in a ſtorm) have failed, they have ſucceeded by the crew collecting themſelves near the weather fore-ſhrouds the moment the helm was put down. It muſt be agreeable to the reflecting ſeaman to ſee this practice ſupported by undoubted mechanical principles.

63 The evolution accelerated by additional matter.

It will appear paradoxical to ſay that the evolution may be accelerated even by an addition of matter to the ſhip; and though it is only a piece of curioſity, our readers may wiſh to be made ſenſible of it. Let m be the addition, placed in ſome point m lying beyond G from q. Let S be the ſpontaneous centre of converſion before the addition. Let v be the velocity of rotation round g, that is, the velocity of a point whoſe diſtance from g is 1, and let ϱ be the radius vector, or diſtance of a particle from g. We have (ROTATION, N° 22.) $v = \frac{F \cdot q g}{\int p \varrho^2 + m' m g^2}$. But we know (ROTATION, N° 23.) that $\int p \varrho^2 = \int p r^2 + M \cdot G g^2$. Therefore $v = \frac{F \cdot q g}{\int p r^2 + M \cdot G g^2 + m \cdot m g^2}$. Let us determine G g and $m g$ and $q g$.

Let m G be called $\varkappa$. Then, by the nature of the centre of gravity, $M + m : M = G m : g m = \varkappa : g m$, and $g m = \frac{M}{M+m} \varkappa$, and $m \cdot g m^2 = \frac{m M^2}{M+m^2} \varkappa^2$. In like manner, $M \cdot G g^2 = \frac{M m^2}{M+m^2} \varkappa^2$. Now $m M^2 + M m^2 = M m \times M + m$. Therefore $M \cdot G g^2 + m \cdot g m^2 = \frac{M m \times (M+m)}{M+m^2} \varkappa^2$, $= \frac{M m}{M+m} \varkappa^2$. Let n be $= \frac{m}{M+m}$, then $M \cdot G^2 + m \cdot g m^2 = M n \varkappa^2$. Alſo G g $= n \varkappa$, being $= \frac{m}{M+n} \varkappa$. Let q G be called c: then $q g = c + n \varkappa$. Alſo let SG be called e.

We have now for the expreſſion of the velocity $v = \frac{F (c + n \varkappa)}{\int p r^2 + M n \varkappa^2}$, or $v = \frac{F}{M} \times \frac{c + n \varkappa}{\frac{\int p r^2}{M} + n \varkappa^2}$. But (ROTATION, N° 30) $\frac{\int p r^2}{M} = c e$. Therefore, finally, $v = \frac{F}{M} \times \frac{c + n \varkappa}{c e + n \varkappa^2}$. Had there been no addition of matter made, we ſhould have had $v = \frac{F}{M} \times \frac{c}{c e}$. It remains to ſhow, that $\varkappa$ may be ſo taken that $\frac{c}{c e}$ may be leſs than $\frac{c + n \varkappa}{c e + n \varkappa^2}$. Now, if c be to $\varkappa$ as $c e$ to $\varkappa^2$, that is, if $\varkappa$ be

be taken equal to e, the two fractions will be equal. But if z be less than e, that is, if the additional matter is placed anywhere between S and G, the complex fraction will be greater than the fraction $\frac{c}{c\,e}$, and the velocity of rotation will be increased. There is a particular distance which will make it the greatest possible, namely, when z is made $=\frac{1}{n}(\sqrt{c^2+n\,c\,e}-c)$, as will easily be found by treating the fraction $\frac{c+n\,z}{c\,e+n\,z^2}$, with z, considered as the variable quantity, for a maximum. In what we have been saying on this subject, we have considered the rotation only in as much as it is performed round the centre of gravity, although in every moment it is really performed round a spontaneous axis lying beyond that centre. This was done because it afforded an easy investigation, and any angular motion round the centre of gravity is equal to the angular motion round any other point. Therefore the extent and the time of the evolution are accurately defined.—

64 The rotation performed round a spontaneous axis.

From observing that the energy of the force F is proportional to q G, an inattentive reader will be apt to conceive the centre of gravity as the centre of motion, and the rotation as taking place, because the momenta of the sails and rudder, on the opposite sides of the centre of gravity, do not balance each other. But we must always keep in mind that this is not the cause of the rotation. The cause is the want of equilibrium round the point C (fig. 10.), where the actions of the water balance each other. During the evolution, which consists of a rotation combined with a progressive motion, this point C is continually shifting, and the unbalanced momenta which continue the rotation always respect the momentary situation of the point C. It is nevertheless always true that the energy of a force F is proportional *(cæteris paribus)* to q G, and the rotation is always made in the same direction as if the point G were really the centre of conversion. Therefore the mainsail acts always (when oblique) by pushing the stern away from the wind, although it should sometimes act on a point of the vertical lever through C, which is a-head of C.

These observations on the effects of the sails and rudder in producing a conversion, are sufficient for enabling us to explain any case of their action which may occur. We have not considered the effects which they tend to produce by inclining the ship round a horizontal axis, viz. the motions of rolling and pitching. See ROLLING and PITCHING. To treat this subject properly would lead us into the whole doctrine of the equilibrium of floating bodies, and it would rather lead to maxims of construction than to maxims of manœuvre. M. Bouguer's *Traité du Navire* and Euler's *Scientia Navalis* are excellent performances on this subject, and we are not here obliged to have recourse to any erroneous theory.

65 Different operations of the water on the ship and wind on the sails balance each other.

It is easy to see that the lateral pressure both of the wind on the sails and of the water on the rudder tends to incline the ship to one side. The sails also tend to press the ship's bows into the water, and, if she were kept from advancing, would press them down considerably. But by the ship's motion, and the prominent form of her bows, the resistance of the water to the fore part of the ship produces a force which is directed upwards. The sails also have a small tendency to raise the ship, for they constitute a surface which in general separates from the plumb-line below. This is remarkably the case in the stay-sails, particularly the jib and fore-topmast stay-sail. And this helps greatly to soften the plunges of the ship's bows into the head seas. The upward pressure also of the water on her bows, which we just now mentioned, has a great effect in opposing the immersion of the bows which the sails produce by acting on the long levers furnished by the masts. M. Bouguer gives the name of *point velique* to the point V (fig. 12.) of the mast, where it is cut by the line CV, Fig. 12. which marks the mean place and direction of the whole impulse of the water on the bows. And he observes, that if the mean direction of all the actions of the wind on the sails be made to pass also through this point, there will be a perfect equilibrium, and the ship will have no tendency to plunge into the water or to rise out of it; for the whole action of the water on the bows, in the direction CV, is equivalent to, and may be resolved into the action CE, by which the progressive motion is resisted, and the vertical action CD, by which the ship is raised above the water. The force CE must be opposed by an equal force VD, exerted by the wind on the sails, and the force CD is opposed by the weight of the ship. If the mean effort of the sails passes above the point V, the ship's bow will be pressed into the water; and if it pass below V, her stern will be pressed down. But, by the union of these forces, she will rise and fall with the sea, keeping always in a parallel position. We apprehend that it is of very little moment to attend to the situation of this point. Except when the ship is right afore the wind, it is a thousand chances to one that the line CV of mean resistance does not pass through any mast; and the fact is, that the ship cannot be in a state of uniform motion on any other condition but the perfect union of the line of mean action of the sails, and the line of mean action of the resistance. But its place shifts by every change of leeway or of trim; and it is impossible to keep these lines in one constant point of intersection for a moment, on account of the incessant changes of the surface of the water on which she floats. M. Bouguer's observations on this point are, however, very ingenious and original.

66 Chief evolutions described.

We conclude this dissertation, by describing some of the chief movements or evolutions. What we have said hitherto is intended for the instruction of the artist, by making him sensible of the mechanical procedure. The description is rather meant for the amusement of the landsman, enabling him to understand operations that are familiar to the seaman. The latter will perhaps smile at the awkward account given of his business by one who cannot hand, reef, or steer.

To tack Ship.

THE ship must first be kept full, that is, with a very sensible angle of incidence on the sails, and by no means hugging the wind. For as this evolution is chiefly performed by the rudder, it is necessary to give the ship a good velocity. When the ship is observed to luff up of herself, that moment is to be catched for beginning the evolution, because she will by her inherent force continue this motion. The helm is then put down. When the officer calls out Helm's a lee, the fore-sheet, fore-top bowline, jib, and flag sail sheets forward

ward are let go. The jib is frequently hauled down. Thus the obſtacles to the ſhip's head coming up to the wind by the action of the rudder are removed. If the mainſail is ſet, it is not unuſual to clue up the weather ſide, which may be conſidered as a headſail, becauſe it is before the centre of gravity. The mizen muſt be hauled out, and even the ſail braced to windward. Its power in paying off the ſtern from the wind conſpires with the action of the rudder. It is really an aerial rudder. The ſails are immediately taken aback. In this ſtate the effect of the mizen-topſail would be to obſtruct the movement, by preſſing the ſtern the contrary way to what it did before. It is therefore either immediately braced about ſharp on the other tack, or lowered. Bracing it about evidently tends to pay round the ſtern from the wind, and thus aſſiſt in bringing the head up to the wind. But in this poſition it checks the progreſſive motion of the ſhip, on which the evolution chiefly depends. For a rapid evolution, therefore, it is as well to lower the mizen-topſail. Meantime, the headſails are all aback, and the action of the wind on them tends greatly to pay the ſhip round. To increaſe this effect, it is not unuſual to haul the fore-top bowline again. The ſails on the mainmaſt are now almoſt becalmed; and therefore when the wind is right ahead, or a little before, the mainſail is hauled round and braced up ſharp on the other tack with all expedition. The ſtayſail ſheets are now ſhifted over to their places for the other tack. The ſhip is now entirely under the power of the headſails and of the rudder, and their actions conſpire to promote the converſion. The ſhip has acquired an angular motion, and will preſerve it, ſo that now the evolution is ſecured, and ſhe falls off apace from the wind on the other tack. The farther action of the rudder is therefore unneceſſary, and would even be prejudicial, by cauſing the ſhip to fall off too much from the wind before the ſails can be ſhifted and trimmed for ſailing on the other tack. It is therefore proper to right the helm when the wind is right ahead, that is, to bring the rudder into the direction of the keel. The ſhip continues her converſion by her inherent force and the action of the headſails.

When the ſhip has fallen off about four points from the wind, the headſails are hauled round, and trimmed ſharp on the other tack with all expedition; and although this operation was begun with the wind four points on the bow, it will be ſix before the ſails are braced up, and therefore the headſails will immediately fill. The after-ſails have filled already, while the headſails were inactive, and therefore immediately check the farther falling off from the wind. All ſails now draw, for the ſtayſail ſheets have been ſhifted over while they were becalmed or ſhaking in the wind. The ſhip now gathers way, and will obey the ſmalleſt motion of the helm to bring her cloſe to the wind.

We have here ſuppoſed, that during all this operation the ſhip preſerves her progreſſive motion. She muſt therefore have deſcribed a curve line, advancing all the while to windward. Fig. 13. is a repreſentation of this evolution when it is performed in the compleſeſt manner. The ſhip ſtanding on the courſe E *a*, with the wind blowing in the direction WF, has her helm put hard a-lee when ſhe is in the poſition A. She immediately deviates from her courſe, and deſcribing a curve, comes to the poſition B, with the wind blowing in the direction WF of the yards, and the ſquare-ſails now ſhiver. The mizen topſail is here repreſented braced ſharp on the other tack, by which its tendency to aid the angular motion (while it checks the progreſſive motion) is diſtinctly ſeen. The main and fore-ſails are now ſhivering, and immediately after are taken aback. The effect of this on the headſails is diſtinctly ſeen to be favourable to the converſion, by puſhing the point F in the direction F *i*; but for the ſame reaſon it continues to retard the progreſſive motion. When the ſhip has attained to the poſition C, the main-ſail is hauled round and trimmed for the other tack. The impulſe in the direction F*i* ſtill aids the converſion and retards the progreſſive motion. When the ſhip has attained a poſition between C and D, ſuch that the main and mizen topſail yards are in the direction of the wind, there is nothing to counteract the force of the headſails to pay the ſhip's head off from the wind. Nay, during the progreſs of the ſhip to this intermediate poſition, if any wind gets at the main or mizen topſails, it acts on their anterior ſurfaces, and impels the after parts of the ſhip away from the curve *a b c d*, and thus aids the revolution. We have therefore ſaid, that when once the ſails are taken fully aback, and particularly when the wind is brought right ahead, it is ſcarce poſſible for the evolution to fail; as ſoon therefore as the main topſail (trimmed for the other tack) ſhivers, we are certain that the headſails will be filled by the time they are hauled round and trimmed. The ſtayſails are filled before this, becauſe their ſheets have been ſhifted, and they ſtand much ſharper than the ſquare-ſails; and thus every thing tends to check the falling off from the wind on the other tack, and this no ſooner than it ſhould be done. The ſhip immediately gathers way, and holds on in her new courſe *d* G.

Fig. 13.

But it frequently happens, that in this converſion the ſhip loſes her whole progreſſive motion. This ſometimes happens while the ſails are ſhivering before they are taken fully aback. It is evident, that in this caſe there is little hopes of ſucceſs, for the ſhip now lies like a log, and neither ſails nor rudder have any action. The ſhip drives to leeward like a log, and the water acting on the lee ſide of the rudder checks a little the driving of the ſtern. The head therefore falls off again, and by and by the ſails fill, and the ſhip continues on her former tack. This is called MISSING STAYS, and it is generally owing to the ſhip's having too little velocity at the beginning of the evolution. Hence the propriety of keeping the ſails well filled for ſome little time before. Rough weather, too, by raiſing a wave which beats violently on the weather-bow, frequently checks the firſt luffing of the ſhip, and beats her off again.

If the ſhip loſe all her motion after the headſails have been fully taken aback, and before we have brought the wind right ahead, the evolution becomes uncertain, but by no means deſperate; for the action of the wind on the headſails will preſently give her ſternway. Suppoſe this to happen when the ſhip is in the poſition C. Bring the helm over hard to windward, ſo that the rudder ſhall have the poſition repreſented by the ſmall dotted line *e f*. It is evident, that the reſiſtance of the water to the ſtern-way of the rudder acts in a favourable direction, puſhing the ſtern outwards. In the mean time, the action of the wind on the headſails puſhes the head in the oppoſite direction. Theſe actions

tions conſpire therefore in promoting the evolution; and if the wind is right ahead, it cannot fail, but may even be completed ſpeedily, becauſe the ſhip gathers ſternway, and the action of the rudder becomes very powerful; and as ſoon as the wind comes on the formerly lee-bow, the action of the water on the now lee-quarter will greatly accelerate the converſion. When the wind therefore has once been brought nearly right ahead, there is no riſk of being baffled.

But ſhould the ſhip have loſt all her headway conſiderably before this, the evolution is very uncertain: for the action of the water on the rudder may not be nearly equal to its contrary action on the lee-quarter; in which caſe, the action of the wind on the headſails may not be ſufficient to make up the difference. When this is obſerved, when the ſhip goes aſtern without changing her poſition, we muſt immediately throw the headſails completely aback, and put the helm down again, which will pay off the ſhip's head from the wind enough to enable us to fill the ſails again on the ſame tack, to try our fortune again; or we muſt BOXHAUL the ſhip, in the manner to be deſcribed by and by.

Such is the ordinary proceſs of tacking ſhip; a proceſs in which all the different modes of action of the rudder and ſails are employed. To execute this evolution in the moſt expeditious manner, and ſo as to gain as much on the wind as poſſible, is conſidered as the teſt of an expert ſeaman. We have deſcribed the proceſs which is beſt calculated for *enſuring* the movement. But if the ſhip be ſailing very briſkly in ſmooth water, ſo that there is no danger of miſſing ſtays, we may gain more to windward conſiderably by keeping faſt the fore-top bowline and the jib and ſtay-ſail ſheets till the ſquare-ſails are all ſhivering: For theſe ſails, continuing to draw with conſiderable force, and balancing each other tolerably fore and aft, keep up the ſhip's velocity very much, and thus maintain the power of the rudder. If we now let all fly when the ſquare ſails are ſhivering, the ſhip may be conſidered as without ſails, but expoſed to the action of the water on the lee-bow; from which ariſes a ſtrong preſſure of the bow to windward, which conſpires with the action of the rudder to aid the converſion. It evidently leaves all that tendency of the bow to windward which ariſes from leeway, and even what was counteracted by the formerly unbalanced action of theſe head-ſtayſails. This method lengthens the whole time of the evolution, but it advances the ſhip to windward. Obſerve, too, that keeping faſt the fore-top bowline till the ſail ſhivers, and then letting it go, inſures the taking aback of that ſail, and thus inſtantly produces an action that is favourable to the evolution.

The moſt expert ſeamen, however, differ among themſelves with reſpect to theſe two methods, and the firſt is the moſt generally practiſed in the Britiſh navy, becauſe the leaſt liable to fail. The forces which oppoſe the converſion are ſooner removed, and the production of a favourable action by the backing of the fore-top-ſail is alſo ſooner obtained, by letting go the fore-top bowline at the firſt.

Having entered ſo minutely into the deſcription and rationale of this evolution, we have ſufficiently turned the reader's attention to the different actions which co-operate in producing the motions of converſion. We ſhall therefore be very brief in our deſcription of the other evolutions.

To wear Ship.

WHEN the ſeaman ſees that his ſhip will not go about head to wind, but will miſs ſtays, he muſt change his tack the other way; that is, by turning her head away from the wind, going a little way before the wind, and then hauling the wind on the other tack. This is called WEARING or VEERING ſhip. It is moſt neceſſary in ſtormy weather with little ſail, or in very faint breezes, or in a diſabled ſhip.

The proceſs is exceedingly ſimple; and the mere narration of the procedure is ſufficient for ſhowing the propriety of every part of it.

Watch for the moment of the ſhip's falling off, and then haul up the mainſail and mizen, and ſhiver the mizen topſail, and put the helm a-weather. When the ſhip falls off ſenſibly (and not before), let go the bowlines. Eaſe away the fore-ſheet, raiſe the fore-tack, and gather aft the weather fore-ſheet, as the lee-ſheet is eaſed away. Round in the weather-braces of the fore and main-maſts, and keep the yards nearly biſecting the angle of the wind and keel, ſo that when the ſhip is before the wind the yards may be ſquare. It may even be of advantage to round in the weather-braces of the main-topſail more than thoſe of the head-ſails; for the mainmaſt is abaft the centre of gravity. All this while the mizen-topſail muſt be kept ſhivering, by rounding in the weather-braces as the ſhip pays off from the wind. Then the main top-ſail will be braced up for the other tack by the time that we have brought the wind on the weather-quarter. After this it will be full, and will aid the evolution. When the wind is right aft, ſhift the jib and ſtay-ſail ſheets. The evolution now goes on with great rapidity; therefore briſkly haul on board the fore and main tacks, and haul out the mizen, and ſet the mizen-ſtayſail as ſoon as they will take the wind the right way. We muſt now check the great rapidity with which the ſhip comes to the wind on the other tack, by righting the helm before we bring the wind on the beam; and all muſt be trimmed ſharp fore and aft by this time, that the headſails may take and check the coming-to. All being trimmed, ſtand on cloſe by the wind.

We cannot help loſing much ground in this movement. Therefore, though it be very ſimple, it requires much attention and rapid execution to do it with as little loſs of ground as poſſible. One is apt to imagine at firſt that it would be better to keep the headſails braced up on the former tack, or at leaſt not to round in the weather-braces ſo much as is here directed. When the ſhip is right afore the wind, we ſhould expect aſſiſtance from the obliquity of the head-ſails; but the the rudder being the principal agent in the evolution, it is found that more is gained by increaſing the ſhip's velocity, than by a ſmaller impulſe in the headſails more favourably directed. Experienced ſeamen differ, however, in their practice in reſpect of this particular.

To box-haul a Ship.

THIS is a proceſs performed only in critical ſituations, as when a rock, a ſhip, or ſome danger, is ſuddenly ſeen right ahead, or when a ſhip miſſes ſtays. It requires the moſt rapid execution.

The ſhip being cloſe-hauled on a wind, haul up the mainſail

mainſail and mizen, and ſhiver the top-ſails, and put the helm hard a-lee altogether. Raiſe the fore-tack, let go the head bowlines, and brace about the headſails ſharp on the other tack. The ſhip will quickly loſe her way, get ſtern-way, and then fall off; by the joint action of the headſails and of the inverted rudder. When ſhe has fallen off eight points, brace the after-ſails ſquare, which have hitherto been kept ſhivering. This will at firſt increaſe the power of the rudder, by increaſing the ſtern-way, and at the ſame time it makes no oppoſition to the converſion which is going on. The continuation of her circular motion will preſently cauſe them to take the wind on their after ſurfaces. This will check the ſtern-way, ſtop it, and give the ſhip a little head-way. Now ſhift the helm, ſo that the rudder may again act in conjunction with the headſails in paying her off from the wind. This is the critical part of the evolution, becauſe the ſhip has little or no way through the water, and will frequently remain long in this poſition. But as there are no counteracting forces, the ſhip continues to fall off. Then the weather-braces of the after-ſails may be gently rounded in, ſo that the wind acting on their hinder ſurfaces may both puſh the ſhip a little ahead and her ſtern laterally in conjunction with the rudder. Thus the wind is brought upon the quarter, and the headſails ſhiver. By this time the ſhip has acquired ſome headway. A continuation of the rotation would now fill the headſails, and their action would be contrary to the intended evolution. They are therefore immediately braced the other way, nearly ſquare, and the evolution is now completed in the ſame manner with wearing ſhip.

Some ſeamen brace all the ſails aback the moment that the helm is put hard a-lee, but the after-ſails no more aback than juſt to ſquare the yards. This quickly gives the ſhip ſtern-way, and brings the rudder into action in its inverted direction; and they think that the evolution is accelerated by this method.

There is another problem of ſeamanſhip deſerving of our attention, which cannot properly be called an evolution. This is lying-to. This is done in general by laying ſome ſails aback, ſo as to ſtop the head-way produced by others. But there is a conſiderable addreſs neceſſary for doing this in ſuch a way that the ſhip ſhall lie eaſily, and under command, ready to proceed in her courſe, and eaſily brought under weigh.

To bring-to with the fore or main topſail to the maſt, brace that ſail ſharp aback, haul out the mizen, and clap the helm hard a-lee.

Suppoſe the fore topſail to be aback; the other ſails ſhoot the ſhip ahead, and the lee-helm makes the ſhip come up to the wind, which makes it come more perpendicularly on the ſail which is aback. Then its impulſe ſoon exceeds thoſe on the other ſails, which are now ſhivering, or almoſt ſhivering. The ſhip ſtands ſtill awhile, and then falls off, ſo as to fill the after-ſails, which again ſhoot her ahead, and the proceſs is thus repeated. A ſhip lying to in this way goes a good deal ahead and alſo to leeward. If the main-topſail be aback, the ſhip ſhoots ahead, and comes up till the diminiſhed impulſe of the drawing ſails in the direction of the keel is balanced by the increaſed impulſe on the main-topſail. She lies a long while in this poſition, driving ſlowly to leeward; and ſhe at laſt falls off by the beating of the water on her weather-bow. She falls off but little, and ſoon comes up again.

Thus a ſhip lying-to is not like a mere log, but has a certain motion which keeps her under command. To get under weigh again, we muſt watch the time of falling off; and when this is juſt about to finiſh, brace about briſkly, and fill the ſail which was aback. To aid this operation, the jib and fore-topmaſt ſtay-ſail may be hoiſted, and the mizen brailed up: or, when the intended courſe is before the wind or large, back the fore-topſail ſharp, ſhiver the main and mizen topſail, brail up the mizen, and hoiſt the jib and fore-topmaſt ſtay-ſails altogether.

In a ſtorm with a contrary wind, or on a lee ſhore, a ſhip is obliged to lie-to under a very low ſail. Some ſail is abſolutely neceſſary, in order to keep the ſhip ſteadily down, otherwiſe ſhe would kick about like a cork, and roll ſo deep as to ſtrain and work herſelf to pieces. Different ſhips behave beſt under different ſails. In a very violent gale, the three lower ſtay-ſails are in general well adapted for keeping her ſteady, and diſtributing the ſtrain. This mode ſeems alſo well adapted for wearing, which may be done by hauling down the mizen-ſtayſail. Under whatever ſail the ſhip is brought-to in a ſtorm, it is always with a fitted ſail, and never with one laid aback. The helm is laſhed down hard a-lee; therefore the ſhip ſhoots ahead, and comes up till the ſea on her weather-bow beats her off again. Getting under weigh is generally difficult; becauſe the ſhip and rigging are lofty abaft, and hinder her from falling off readily when the helm is put hard a-weather. We muſt watch the falling off, and aſſiſt the ſhip by ſome ſmall headſail. Sometimes the crew get up on the weather fore-ſhrowds in a crowd, and thus preſent a ſurface to the wind.

THESE examples of the three chief evolutions will enable thoſe who are not ſeamen to underſtand the propriety of the different ſteps, and alſo to underſtand the other evolutions as they are deſcribed by practical authors. We are not acquainted with any performance in our language where the whole are conſidered in a connected and ſyſtematic manner. There is a book on this ſubject in French, called *Le Manœuvrier*, by M. Burdé de Ville-Huet, which is in great reputation in France. A tranſlation into Engliſh was publiſhed ſome years ago, ſaid to be the performance of the Chevalier de Sauſeuil a French officer. But this appears to be a bookſeller's puff; for it is undoubtedly the work of ſome perſon who did not underſtand either the French language, or the ſubject, or the mathematical principles which are employed in the ſcientific part. The blunders are not ſuch as could poſſibly be made by a Frenchman not verſant in the Engliſh language, but natural for an Engliſhman ignorant of French. No French gentleman or officer would have tranſlated a work of this kind (which he profeſſes to think ſo highly of) to ſerve the rivals and foes of his country. But indeed it can do no great harm in this way; for the ſcientific part of it is abſolutely unintelligible for want of ſcience in the tranſlator; and the practical part is full of blunders for want of knowledge of the French language.

We offer this account of the ſubject with all proper reſpect and diffidence. We do not profeſs to teach: but

Fig. 1.

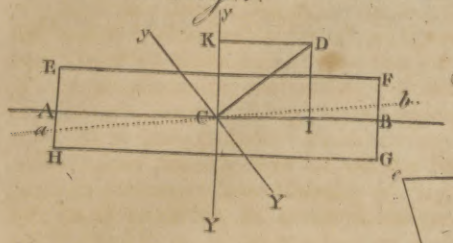


Fig. 2.

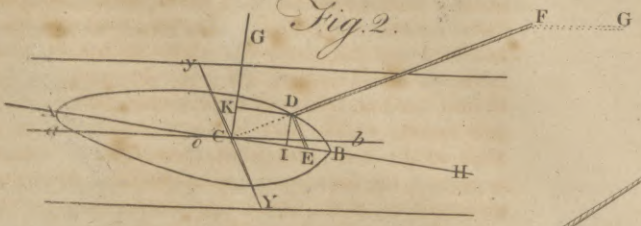


Fig. 3.

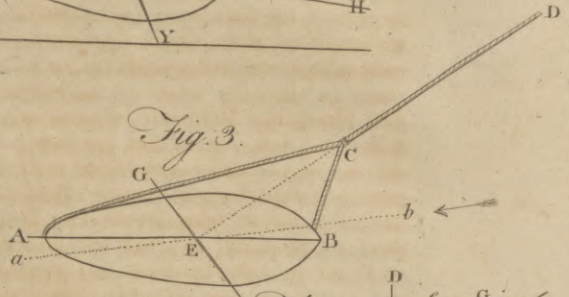


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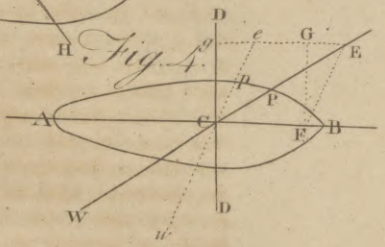


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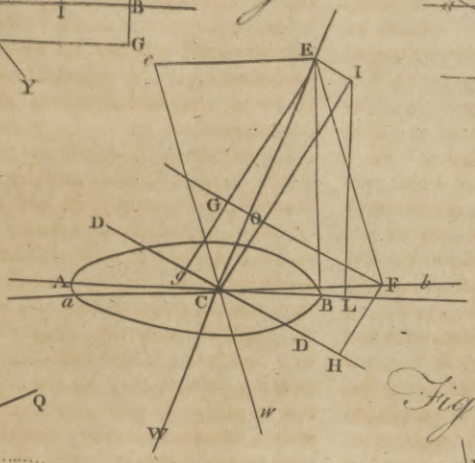


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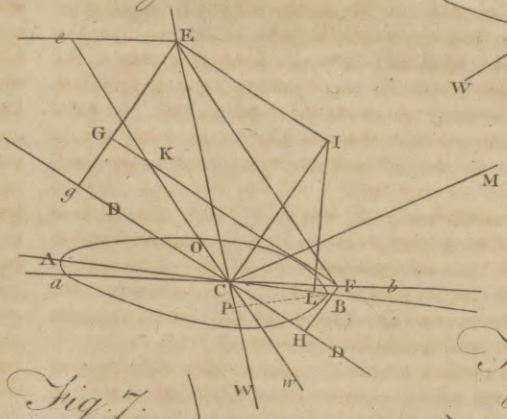


Fig. 7.

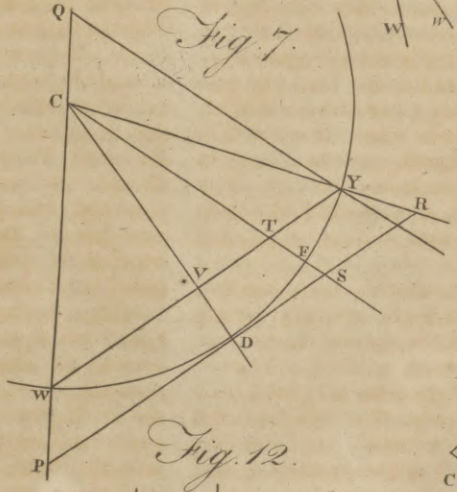


Fig. 8.

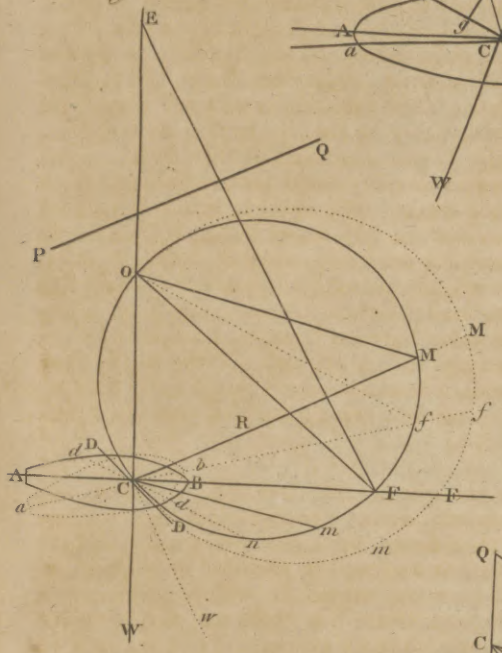


Fig. 9.

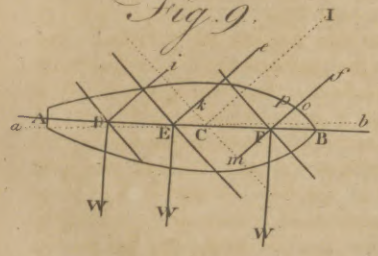


Fig. 10.

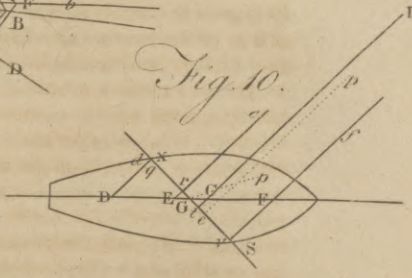


Fig. 11.

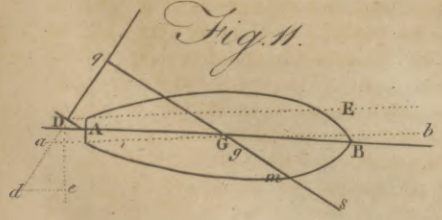


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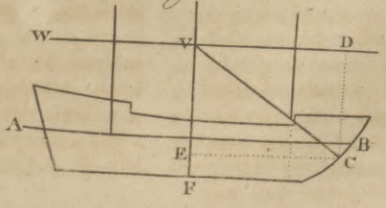
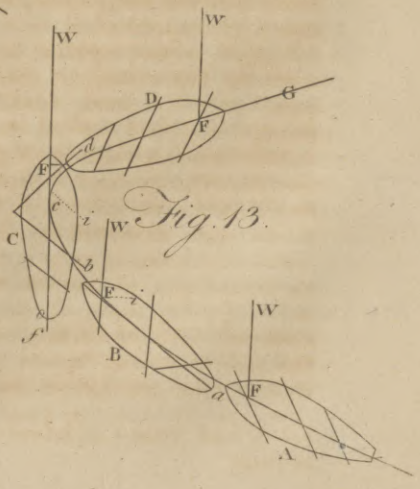


Fig. 13.



E. Mitchell, sculpt.

but by pointing out the defects of the celebrated works of M. Bouguer, and the courſe which may be taken to remove them, while we preſerve much valuable knowledge which they contain, we may perhaps excite ſome perſons to apply to this ſubject, who, by a combination of what is juſt in M. Bouguer's theory, with an experimental doctrine of the impulſes of fluids, may produce a treatiſe of ſeamanſhip which will not be confined to the libraries of mathematicians, but become a manual for ſeamen by profeſſion.

SEA

Seamen. SEAMEN, ſuch perſons as ſerve the king or others at ſea by navigation and fighting ſhips, &c. See *MARITIME State*.

Seamen fighting, quarrelling, or making any diſturbance, may be puniſhed by the commiſſioners of the navy with fine and impriſonment. Regiſtered ſeamen are exempted from ſerving in any pariſh office, &c. and are allowed bounty-money beſide their pay. By the law of merchants, the ſeamen of a veſſel are accountable to the maſter or commander, the maſter to the owners, and the owners to the merchants, for damage ſuſtained either by negligence or otherwiſe. Where a ſeamen is hired for a voyage, and he deſerts before it is ended, he ſhall loſe his wages; and in caſe a ſhip be loſt in a ſtorm, the ſeamen loſe their wages, as well as the owners their freight.

Means of Preſerving the Health of SEAMEN. See MEDICINE, N° 351.

In addition to what has been ſaid on this ſubject in the place referred to, we ſhall ſubjoin ſome valuable obſervations which we have met with in the ſixth volume of the Memoirs of the Royal Society of Medicine at Paris for the years 1784 and 1785.

In 1783, the marſhal de Caſtries, intending to make ſome changes in the regulations of the navy, particularly with regard to diet, propoſed to the ſociety the two following queſtions: 1. "What are the moſt wholeſome aliments for ſeamen, conſidering the impoſſibility of procuring them freſh meat? And what kinds of ſalt meat or fiſh, of pulſe, and of drink, are moſt proper for them, and in what quantity, not omitting to inquire into the regimens in uſe amongſt other maritime nations for what may be adopted by us, and into what experience has evinced the utility of, from the accounts of the moſt celebrated navigators?" 2. "A number of patients labouring under different diſeaſes being aſſembled in naval hoſpitals, and different conſtitutions affected by the ſame diſeaſe requiring difference of diet, what general dietetic rules for an hoſpital would be beſt adapted to every exigence, dividing the patients into three claſſes; the firſt in which liquids alone are proper, the ſecond in which we begin to give ſolids in ſmall quantities, and the ſtate of convaleſcence in which a fuller diet is neceſſary?" A committee was appointed to draw up an anſwer to theſe, who inveſtigated the ſubject very minutely. The reſult of their labours is there given at large. The obſervations moſt worthy of notice are, that the ſcurvy of the Engliſh ſeamen, who live chiefly on ſalt-meat, is a putrid diſeaſe; whilſt that of the Dutch, who uſe farinaceous vegetables and dried pulſe in large quantities, has more of an hydropical tendency. A mixture of both, even at the ſame meal, is recommended. This is ſupported by philoſophical reaſoning, and the example of Captain Cook, who was partly indebted to this mixed regimen for the preſervation of his crew. Salt fiſh ſhould never be uſed: ſalt beef grows hard, and after boiling its fibrous parts only remain, which are more calculated to load the ſtomach than recruit the ſtrength. Salt bacon may be kept at ſea 18 months; it does not loſe its moiſt and nutrimental parts, and unites better with pulſe, but ſhould not be uſed when rancid. Live animals kept on board ſhips tend to produce diſeaſes amongſt the crew. Rice ſhould be uſed largely. Our puddings are bad food: the flour would be much better made into bread, which might be done at ſea with no great trouble. Sour krout ſhould be uſed freely. Muſtard, vinegar, ſugar, melaſſes, and honey, are good antiſcorbutics. Of drinks, wine is the beſt: wort, ſpruce-beer, or the Ruſſian *quas*, are good ſubſtitutes. Spirits are only to be uſed in cold climates, and in ſmall quantity. The greater part of the excellent memoir in anſwer to the ſecond queſtion, perfectly coincides with M. Duhamel du Monceaux's "Means of Preſerving the Health of Seamen," and M. Poiſſonnier des Perrieres's treatiſes "On the Diſeaſes of Seamen," and "On the advantages of changing the Diet of Seamen," and his "Examination of Pringle's Diſſertation."

SEA

Seamen || Seapoys.

SEAPOYS, or SEPOYS, natives of Indoſtan ſerving in a military capacity under the European powers, and diſciplined after the European manner.

The Seapoys of the Engliſh Eaſt India company compoſe perhaps the moſt numerous, regular, and beſt diſciplined body of black troops in the world. They are raiſed from among the natives of the country, and conſiſt of Moors or Mahometans, Raja-poots, Hindoos, Pariars, beſides many intermediate caſts peculiar to themſelves; the whole modelled in all correſponding particulars, and diſciplined in every reſpect as the army of Great Britain.

The military eſtabliſhments of Bengal, Madras and Bombay, have each their reſpective numbers, that of Bengal exceeding the reſt. The Seapoys are formed into complete, uniform, and regular battalions, as our marching regiments at home, being intended to repreſent and anſwer fully to every purpoſe in India to the like troops in Europe. A battalion conſiſts of 700 men, of complete effective ſtrength. In each there are eight companies, including two flank ones or grenadiers. They are reſpectively commanded by their own black and European officers; to each company there is attached a ſubaltern, who takes the command, under whom are two native commiſſioned officers, bearing the rank of ſubidar and jimindar; of eight ſubalterns, ſix are lieutenants, the other enſigns; excluſive is a ſtaff, of adjutant and ſurgeon. The black non-commiſſioned officers anſwer to our ſerjeants and corporals, and are called *havildars* and *naigues*. There is alſo to each corps an Engliſh ſerjeant-major, drill and ſtore ſerjeant; to each battalion is a band of drums and fifes, and to each

Seapoys. each a pair of colours. A captain commands the whole.

Their jackets, which are made entirely after the European faſhion, are of a red colour with yellow facings (as worn by all the infantry of the company on the Coromandel coaſt). The remaining part of their attire reſembles more the country or Indian habit, and conſiſts of a dark blue turban, broad and round at top, deſcending deep to the bottom, the ſides of which, of a concave form, are croſſed by a white band, running in front, faſtened under a roſe above. As an under garment, they have a jacket of linen. A dark blue faſh girding, to anſwer the turban, goes round their middle. On the thighs they have ſhort drawers, faſtened by a ſcolloped band. Their legs are bare, which renders them more ready for action or ſervice. Their arms are a firelock and bayonet; their accoutrements or croſs belts black leather, with pouches the ſame.

A battalion drawn out cannot but ſtrike the ſpectators with a lively and fanciful military impreſſion, as they unite in their exterior traits reſpectively Indian and European.

They are brought to the utmoſt exactneſs of diſcipline; go through their evolutions and manœuvres with a regularity and preciſion equal to, and not ſurpaſſed by European troops. In action they are brave and ſteady, and have been known to ſtand where Europeans have given way.

Their diſcipline puts them on a footing with European troops, with whom they are always ready to act in concert.

Their utility and ſervices are evident: they ſecure to the company the internal good order and preſervation of their territorial diſtricts, which, though poſſible to be enforced with a ſtrong hand by Europeans, requires numbers, and can only be conducted with that eaſe and addreſs peculiar to the native forces of the country.

They are conſidered with reſpect in the eyes of the other natives, though they ſufficiently, and with a good grace, feel and aſſert their own conſequence. In large garriſons, where the duty is great, as Madras, Pondicherry, Trichinopoly, Vellore, &c. two or three battalions might be preſent together, excluſive of Europeans. If ſent ſingly up the country, they are liable to be detached, ſometimes by one or more companies being ſent to a ſtation dependent on the chief garriſon or headquarters, otherwiſe they are diſperſed through the diſtricts, four or five together, with a non-commiſſioned officer (this is a part of the ſervice which is called *going on command*), on hills, or in villages, to preſerve order, convey intelligence, and aſſiſt the taſildar, renter, or cutwall of the place, in caſes of emergency. They alſo enforce the police, and prevent in ſuch caſes the country from being infeſted with thieves, which otherwiſe have combined, forming a banditti, to rob paſſengers and plunder cattle, of which there are ſo many inſtances upon record. As for ſuch Britiſh officers in the company's ſervice as are attached to battalions, they are obliged to follow the fortunes and deſtinations of their men, with their reſpective corps, leading a life often replete with adventures of a peculiar nature. An individual in ſuch caſes is frequently ſecluded from thoſe of his own colour when up the country, or detached upon command, where in a frontier garriſon or hill fort in the interior parts of India none but natives are to be found. Here he might live as he pleaſes, being perfectly abſolute within his juriſdiction. Such ſtations being lucrative, with management may produce great fortunes. Neither is the condition hard to a perſon converſant in the language of the country, or that of the Seapoys called *Moors* (which moſt officers in the company's ſervice acquire); otherwiſe the loſs of ſociety is not recompenſed by other advantages, as you forget your own language, grow melancholy, and paſs your days without comfort. Seapoys || Search-warrants.

The peace eſtabliſhment at Madras conſiſts of 30 Seapoy battalions, but in time of war is augmented as occaſion requires; or frequently each corps is ſtrengthened by the addition of two companies, which are reduced again in time of peace, the officers remaining ſupernumeraries in the ſervice. In garriſon they are quartered in barracks: they live agreeably to the uſage of the country, ſleep on the ground on a mat or thin carpet. In their perſons they are cleanly, but appear to beſt advantage in their uniform. Off duty they go as the other natives in poor circumſtances; and have only a cloth round their middle and over their ſhoulders. As to the different caſts, the Moormen or Muſſulmen aſſert pre-eminence, as coming into the country by conqueſt. In their perſons they are rather robuſt, and in their tempers vindictive. Their religion and dreſs is diſtinct from the Hindoos, who are mild and paſſive in their temper, faithful, ſteady, and good ſoldiers. The Pariars are inferior to the others, live under different circumſtances, dwell in huts, and aſſociate not on equal terms with the reſt; they do all menial offices, are ſervants to Europeans, and think themſelves happy when by them employed, though they are equally good Seapoys.

Having thus treated of the company's Seapoys, we ſhall obſerve that they are kindly attentive to their officers when often in circumſtances requiring their aſſiſtance; are guilty of few vices; and have a ſtrong attachment for thoſe who have commanded them. That acute hiſtorian Dr Robertſon has remarked, as a proof that the ingenuity of man has recourſe in ſimilar ſituations to the ſame expedients that the European powers, have, in forming the eſtabliſhment of theſe native troops, adopted the ſame maxims, and, probably without knowing it, have modelled their battalions of Seapoys upon the ſame principles as Alexander the Great did his phalanx of Perſians.

SEARCH-WARRANT, in *Law*, a kind of general warrant iſſued by juſtices of peace or magiſtrates of towns for ſearching all ſuſpected places for ſtolen goods. In Scotland this was often done formerly; and in ſome Engliſh law-books there are precedents requiring the conſtable to ſearch all ſuch ſuſpected places as he and the party complaining ſhall think convenient; but ſuch practice is condemned by Lord Hale, Mr Hawkins, and the beſt authorities both among the Engliſh and Scotch lawyers. However, in caſe of a complaint, and oath made of goods ſtolen, and that the party ſuſpects that thoſe goods are in a particular houſe, and ſhows the cauſe of ſuch ſuſpicion, the juſtice may grant a warrant to ſearch not only that houſe but other ſuſpected places; and to attach the goods, and the party in whoſe cuſtody they are found, and bring them before him or ſome other juſtice, to give an account how he came by them, and to abide ſuch order as to law ſhall appertain; which

Searcher || Seaſoning.

which warrant ſhould be directed to the conſtable or other public officer, who may enter a ſuſpected houſe and make ſearch.

SEARCHER, an officer in the cuſtoms, whoſe buſineſs it is to ſearch and examine ſhips outwards bound, if they have any prohibited goods on board, &c. (12 Car. II.). There are alſo ſearchers of leather, &c. See ALNAGER.

SEARCHER, in ordnance, is an iron ſocket with branches, from four to eight in number, a little bent outwards, with ſmall points at their ends; to this ſocket is fixed a wooden handle, from eight to twelve feet long, of about an inch and a quarter diameter. After the gun has been fired, this ſearcher is introduced into it, and turned round, in order to diſcover the cavities within. The diſtances of theſe cavities, if any be found, are then marked on the outſide with chalk, when another ſearcher that has only one point, about which a mixture of wax and tallow is put, is introduced to take the impreſſion of the holes; and if there be any hole, a quarter of an inch deep, or of any conſiderable length, the gun is rejected as unſerviceable.

SEARCLOTH, or CERECLOTH, in *Surgery*, a form of external remedy ſomewhat harder than an unguent, yet ſofter than an emplaſter, though it is frequently uſed both for the one and the other. The cerecloth is always ſuppoſed to have wax in its compoſition, which diſtinguiſhes and even denominates it. In effect, when a liniment or unguent has wax enough in it, it does not differ from a cerecloth.

SEASIN, in a ſhip, the name of a rope by which the boat rides by the ſhip's ſide when in harbour, &c.

SEASONING, the firſt illneſs to which perſons habituated to colder climates are ſubject on their arrival in the Weſt Indies. This ſeaſoning, unleſs they live very temperately, or are in a proper habit of body (though ſome people are unmoleſted for many months), ſeldom ſuffers them to remain long before it makes its appearance in ſome mode or other; particularly if at firſt they expoſe themſelves in a ſhower of rain, or too long in the ſun, or in the night-air; or when the body is much heated, if they drink large draughts of cold liquors, or bathe in cold water; or uſe much exerciſe; or commit exceſs in drinking wine or ſpirits; or by heating the body and inflaming the blood; or by ſubjecting themſelves to any cauſe that may ſuddenly check perſpiration, which at firſt is generally exceſſive.

Moſeley on Tropical Diſeaſes.

Some people, from a favourable ſtate of body, have no ſeaſoning. Thin people, and very young people, are moſt likely to eſcape it. Women generally do from their temperance, and perhaps their menſtruation contributes to their ſecurity; indeed hot climates are favourable to the delicacy of their habits, and ſuitable to their modes of life. Some eſcape by great regularity of living; ſome, by the breaking out of the raſh, called the *prickly heat*; ſome by a great degree of perſpiration; and ſome by obſerving a cooling regimen. The diſorders are various that conſtitute this ſeaſoning of *new-comers* as they are called; depending on age, conſtitution, and habit of body. But all ſeaſoning diſeaſes are of the inflammatory kind; and yield to antiphlogiſtic treatment proportioned to their violence. When all precaution to guard againſt ſickneſs has failed, and prudence proved abortive to new-comers, they will have this comfort at leaſt for their pains, that their diſorders will ſeldom be ſevere or expenſive, and will generally have a ſpeedy termination; and that their ſeaſoning, as it is emphatically called, will be removed by bleeding, a doſe of ſalts, reſt, and a cooling regimen.

Seaſoning || Sebuæi.

SEASONING of Timber. See TIMBER.

SEASONS, in *Coſmography*, certain portions or quarters of the year, diſtinguiſhed by the ſigns which the ſun then enters, or by the meridian altitudes of the ſun; conſequent on which are different temperatures of the air, different works in tillage, &c. See WEATHER.

The year is divided into four ſeaſons, ſpring, ſummer, autumn, and winter. The beginnings and endings of each whereof, ſee under its proper article. It is to be obſerved, the ſeaſons anciently began differently from what they now do: witneſs the old verſes,

Dat Clemens hyemem; dat Petrus ver cathedratus;
Æſtuat Urbanus; autumnat Bartholomæus.

SEAT, in the manege, is the poſture or ſituation of a horſeman upon the ſaddle.

SEATON, a ſmall fiſhing town on the ſouth coaſt of Devon, between Lyme and Sidmouth. Riſdon ſays "our learned antiquarians would have it to be that *Maridunum* whereof Antonine ſpake, placed between Dunnovaria and Iſca; for *Maridunum* in Britiſh is the ſame with *Seaton* in Engliſh, "a town upon a hill by the ſea-ſide." This place is memorable for the Daniſh princes landing there in the year 937.

SEBACIC ACID, ſo called, becauſe it is procured from fat. For an account of its preparation and properties, ſee CHEMISTRY, page 540. and N° 802.

ST SEBASTIAN, a handſome, populous, and ſtrong town of Spain, in the province of Guipuſcoa, with a good and well frequented harbour. It is ſeated at the foot of a mountain; and the harbour ſecured by two moles, and a narrow entrance for the ſhips. The town is ſurrounded with a double wall, and to the ſea-ſide is fortified with baſtions and half moons. The ſtreets are long, broad, and ſtraight, and paved with white flag-ſtones. At the top of the mountain is a citadel, with a garriſon well furniſhed with cannon. The town carries on a conſiderable trade, the greateſt part of which conſiſts of iron and ſteel, which ſome reckon to be the beſt in Europe. They alſo deal in wood, which comes from Old Caſtile. W. Long. 1. 59. N. Lat. 43. 23.—The capital of Braſil in South America is likewiſe called *Sebaſtian*.

SEBASTIANO, called *Del Piombo*, from an office in the lead mines given him by Pope Clement VII. was an eminent Venetian painter, born in 1485. He was firſt a diſciple of old Giovanni Bellino; continued his ſtudies under Giorgione; and having attained an excellent manner of colouring, went to Rome, where he inſinuated himſelf into the favour of Michael Angelo. He has the name of being the firſt who invented the art of preparing plaſter-walls for oil-painting; but was ſo ſlow and lazy in his work, that other hands were often employed to finiſh what he began. He died in 1547.

SEBESTEN. See CORDIA, BOTANY *Index*.

SEBUÆI, a ſect among the ancient Samaritans, whom St Epiphanius accuſes of changing the time expreſſed in the law, for the celebration of the great annual feaſts of the Jews.

Seburai || Secale.

SEBURAI, SEBURÆI, a name which the Jews give to ſuch of their rabbins or doctors as lived and taught ſome time after the finiſhing of the Talmud.

SECACUL, in the *Materia Medica* of the ancients, a name given by Avicenna, Serapion, and others, to a root which was like ginger, and was brought from the Eaſt Indies, and uſed as a provocative to venery. The interpreters of their works have rendered this word *eringo;* and hence ſome have ſuppoſed that our *eryngium* or *eryngo* was the root meant by it: but this does not appear to be the caſe on a ſtrict inquiry, and there is ſome reaſon to believe that the famous root, at this time called *ginſeng*, was what they meant.

SECALE, RYE, a genus of plants belonging to the triandria claſs; and in the natural method ranking under the 4th order, *Gramina*. See BOTANY and AGRICULTURE *Index*.

The *cereale*, or common rye, has glumes with rough fringes. It is a native of the iſland of Candia, was introduced into England many ages ago, and is the only ſpecies of rye cultivated in this kingdom. There are, however, two varieties, the winter and ſpring rye.

The winter rye, which is larger in the grain than the ſpring rye, is ſown in autumn at the ſame time with wheat, and ſometimes mixed with it; but as the rye ripens ſooner than the wheat, this method muſt be very exceptionable. The ſpring rye is ſown along with the oats, and uſually ripens as ſoon as the winter rye; but the grain produced is lighter, and it is therefore ſeldom ſown except where the autumnal crop has failed.

Rye is commonly ſown on poor, dry, limeſtone, or ſandy ſoils, where wheat will not thrive. By continuing to ſow it on ſuch a ſoil for two or three years, it will at length ripen a month earlier than that which has been raiſed for years on ſtrong cold ground.

Rye is commonly uſed for bread either alone or mixed with wheat. This mixture is called *meſlin*, and was formerly a very common crop in ſome parts of Britain. Mr Marſhall tells us, that the farmers in Yorkſhire believe that this mixed crop is never affected by mildew, and that a ſmall quantity of rye ſown among wheat will prevent this deſtructive diſeaſe. Rye is much uſed for bread in ſome parts of Sweden and Norway by the poor people. About a century ago rye-bread was alſo much uſed in England; but being made of a black kind of rye, it was of the ſame colour, clammy, very detergent, and conſequently not ſo nouriſhing as wheat.

Rye is ſubject to a diſeaſe which the French call *ergot*, and the Engliſh *horned rye;* which ſometimes happens when a very hot ſummer ſucceeds a rainy ſpring. According to Tiſſot, horned rye is ſuch as ſuffers an irregular vegetation in the middle ſubſtance between the grain and the leaf, producing an excreſcence of a browniſh colour, about an inch and a half long, and two-tenths of an inch broad. Bread made of this kind of rye has a nauſeous acrid taſte, and produces ſpaſmodic and grangrenous diſorders. In 1596, an epidemic diſeaſe prevailed in Heſſe, which the phyſicians aſcribed to bread made of horned rye. Some, we are told, were ſeized with an epilepſy, and theſe ſeldom ever recovered; others became lunatic, and continued ſtupid the reſt of their lives: thoſe who apparently recovered had annual returns of their diſorder in January and February; and the diſeaſe was ſaid to be contagious at leaſt in a certain degree. The facts which we have now mentioned are taken from a work of Tiſſot, which was never printed. The ſame diſeaſe was occaſioned by the uſe of this bread in ſeveral parts of the continent in the years 1648, 1675, 1702, 1716, 1722, and 1736; and has been very minutely deſcribed by Hoffman, A. O. Goelicke, Vater Burghart, and J. A. Srink.

Secale || Seceders.

In the year 1709, one fourth part of all the rye raiſed in the province of Salonia in France was horned, and the ſurgeon to the hoſpital of Orleans had no leſs than 500 patients under his care that were diſtempered by eating it: They were called *ergots*, from *ergot* (A), the French name for horned rye; they conſiſted chiefly of men and boys, the number of women and girls being very ſmall. The firſt ſymptom was a kind of drunkenneſs, then the local diſorder began in the toes, and thence extended ſometimes to the thigh, and the trunk itſelf, even after amputation, which is a good argument againſt that operation before the gangrene is ſtopped.

In the year 1710, the celebrated Fontenelle deſcribes a caſe in the Hiſtory of the Academy of Sciences of France, which exactly reſembles that of the poor family at Wattiſham. A peaſant at Blois, who had eaten horned rye in bread, was ſeized with a mortification which firſt cauſed all the toes of one foot to fall off, then the toes of the other, afterwards the remainder of the feet, and, laſtly, it ate off the fleſh of both his legs and thighs, leaving the bones bare.

Horned rye is not only hurtful to man, but to other animals; it has been known to deſtroy even the flies that ſettled upon it; ſheep, dogs, deer, geeſe, ducks, ſwine, and poultry, that were fed with it for experiment, died miſerably, ſome convulſed, others mortified and ulcerated.

SECANT, in *Geometry*, a line that cuts another or divides it into parts. The ſecant of a circle is a line drawn from the circumference on one ſide to a point without the circumference on the other; and it is demonſtrated by geometers, that of ſeveral ſecants drawn to the ſame point, that is the longeſt which paſſes through the centre of the circle. The portions, however, of theſe ſeveral ſecants that are without the circle are ſo much the greater as they recede from the centre, and the leaſt external portion is of that ſecant which paſſes through it.

SECANT, in *Trigonometry*, denotes a right line drawn from the centre of a circle, which, cutting the circumference, proceeds till it meets with a tangent to the ſame circle. See GEOMETRY.

Line of SECANTS, one of thoſe lines or ſcales which are uſually put upon ſectors. See SECTOR, n° 12.

SECEDERS, a numerous body of Preſbyterians in Scotland, who have withdrawn from the communion of the eſtabliſhed church. As they take up their ground

Seceders.

(A) *Ergot* is French for a cock's ſpur, and horned rye was called *ergot* from the reſemblance of its excreſcence to that part.

Seceders. ground upon the eſtabliſhment of religion from 1638 to 1650, which they hold to be the pureſt period of the Scottiſh church, we ſhall introduce our account of them by a ſhort view of eccleſiaſtical hiſtory from that period to the era of their ſeceſſion. With our uſual candour and impartiality we mean to give a fair ſtatement of thoſe events with which, as they ſay, their ſeceſſion is connected.

James I. having for ſome time previous to his death entertained a wiſh to form the church of Scotland as much as poſſible upon the model of that in England, his ſon Charles, with the aſſiſtance of Archbiſhop Laud, endeavoured to carry the deſign into execution, by eſtabliſhing canons for eccleſiaſtical diſcipline, and introducing a liturgy into the public ſervice of the church.—Numbers of the clergy and laity of all ranks took the alarm at what they conſidered to be a bold and dangerous innovation; and after frequent applications to the throne, they at laſt obtained the royal proclamation for a free parliament and general aſſembly. The aſſembly met in 1638, and began their labours with a repeal of all the acts of the ſix preceding parliaments, which had favoured the deſigns of James. They condemned the liturgy, together with every branch of the hierarchy. They cited all the Scottiſh biſhops to their bar; and after having excommunicated nine of them, and depoſed five from their epiſcopal office, they reſtored kirk-ſeſſions, preſbyteries, and ſynods provincial as well as national. See PRESBYTERIANS.

Theſe proceedings were ratified by the parliament which met in 1640. The law of patronage was in full force for ſeveral years after this period; yet great care was taken that no miniſter ſhould be obtruded on the Chriſtian people contrary to their inclinations; and in 1649 it was aboliſhed as an oppreſſive grievance.

The reſtoration of Charles II. in 1660 changed the face of affairs in the church of Scotland. All that the general aſſembly had done from 1638 to 1650 was rendered null and void, the covenants were pronounced to be unlawful, epiſcopacy was reſtored, and the king was declared to be the ſupreme head of the church in all cauſes civil and eccleſiaſtical. During this period the Preſbyterians were ſubjected to fines and impriſonment, while numbers of them were publicly executed for their adherence to their political and religious tenets.

The Revolution in 1688 gave a different turn to the affairs of the church. The firſt parliament which met after that event, aboliſhed prelacy and the king's ſupremacy in eccleſiaſtical affairs. They ratified the Weſtminſter Confeſſion of Faith, together with the Preſbyterian form of church-government and diſcipline, "as agreeable to the word of God, and moſt conducive to the advancement of true piety and godlineſs, and the eſtabliſhment of peace and tranquillity within theſe realms." That ſame parliament aboliſhed patronage, and lodged the election of miniſters in the hands of heritors and elders, with the conſent of the congregation.

In the reign of Queen Anne the true Proteſtant religion was ratified and eſtabliſhed, together with the Preſbyterian form of church-government and diſcipline; and the unalterable continuance of both was declared to be an eſſential condition of the union of the two kingdoms in all time coming. In 1712 the law reſpecting patronage was revived, in reſentment, it has been ſaid, of that warm attachment which the church of Scotland diſcovered to the family of Hanover; but the ſeverity of that law was greatly mitigated by the firſt parliament of George I. ſtat. 50. by which it is enacted, that, if the preſentee do not ſignify his acceptance, the preſentation ſhall become void and null in law. The church, however, did not avail herſelf of this ſtatute; and an event which happened not many years afterwards gave riſe to the *ſeceſſion*. Seceders.

2 Origin of.

In 1732 more than 40 miniſters preſented an addreſs to the general aſſembly, ſpecifying in a variety of inſtances what they conſidered to be great defections from the eſtabliſhed conſtitution of the church, and craving a redreſs of theſe grievances. A petition to the ſame effect, ſubſcribed by ſeveral hundreds of elders and private Chriſtians, was offered at the ſame time; but the aſſembly refuſed a hearing to both, and enacted, that the election of miniſters to vacant charges, where an accepted preſentation did not take place, ſhould be competent only to a conjunct meeting of elders and heritors, being Proteſtants. To this act many objections were made by numbers of miniſters and private Chriſtians. They aſſerted that more than 30 to one in every pariſh were not poſſeſſed of landed property, and were on that account deprived of what they deemed their natural right to chooſe their own paſtors. It was alſo ſaid, that this act was extremely prejudicial to the honour and intereſt of the church, as well as to the edification of the people; and in fine, that it was directly contrary to the appointment of Jeſus Chriſt, and the practice of the apoſtles, when they filled up the firſt vacancy in the apoſtolic college, and appointed the election of deacons and elders in the primitive church.—Many of thoſe alſo who were thought to be the beſt friends of the church, expreſſed their fears that this act would have a tendency to overturn the eccleſiaſtical conſtitution which was eſtabliſhed at the Revolution.

3 They oppoſe the meaſures of the general aſſembly;

Mr Ebenezer Erſkine, miniſter at Stirling, diſtinguiſhed himſelf by a bold and determined oppoſition to the meaſures of the aſſembly in 1732. Being at that time moderator of the ſynod of Perth and Stirling, he opened the meeting at Perth with a ſermon from Pſalm cxviii. 22. "The ſtone which the builders rejected is become the head ſtone of the corner." In the courſe of his ſermon he remonſtrated with no ſmall degree of freedom againſt the act of the preceding aſſembly with regard to the ſettlement of miniſters, and alleged that it was contrary to the word of God and the eſtabliſhed conſtitution of the church. A formal complaint was lodged againſt him for uttering ſeveral offenſive expreſſions in his ſermon before the ſynod. Many of the members declared that they heard him utter nothing but ſound and ſeaſonable doctrine; but his accuſers inſiſting on their complaint, obtained an appointment of a committee of ſynod to collect what were called the offenſive expreſſions, and to lay them before the next diet in writing. This was done accordingly; and Mr Erſkine gave in his anſwers to every article of the complaint. After three days warm reaſoning on this affair, the ſynod by a majority of ſix found him cenſurable; againſt which ſentence he proteſted, and appealed to the next general aſſembly. When the aſſembly met in May 1733, it affirmed the ſentence of the ſynod, and appointed Mr Erſkine to be rebuked

4 For which their miniſters are cenſured,

and

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Seceders. and admoniſhed from the chair. Upon which he proteſted, that, as the aſſembly had found him cenſurable, and had rebuked him for doing what he conceived to be agreeable to the word of God and the ſtandards of the church, he ſhould be at liberty to preach the ſame truths, and to teſtify againſt the ſame or ſimilar evils, on every proper occaſion. To this proteſt Meſſrs William Wilſon miniſter at Perth, Alexander Moncrief miniſter at Abernethy, and James Fiſher miniſter at Kinclaven, gave in a written adherence, under the form of inſtrument; and theſe four withdrew, intending to return to their reſpective charges, and act agreeably to their proteſt whenever they ſhould have an opportunity. Had the affair reſted here, there never would have been a ſeceſſion; but the aſſembly reſolving to carry on the proceſs, cited them by their officer to compear next day. They obeyed the citation; and a committee was appointed to retire with them, in order to perſuade them to withdraw their proteſt. The committee having reported that they ſtill adhered to their proteſt, the aſſembly ordered them to appear before the commiſſion in Auguſt following and retract their proteſt; and if they ſhould not comply and teſtify their ſorrow for their conduct, the commiſſion was empowered to ſuſpend them from the exerciſe of their miniſtry, with certification that if they ſhould act contrary to ſaid ſentence, the commiſſion ſhould proceed to an higher cenſure.

5 Suſpended from the exerciſe of their office, The commiſſion met in Auguſt accordingly; and the four miniſters ſtill adhering to their proteſt, were ſuſpended from the exerciſe of their office, and cited to the next meeting of the commiſſion in November following. From this ſentence ſeveral miniſters and elders, members of the commiſſion, diſſented. The commiſſion met in November, and the ſuſpended miniſters compeared. Addreſſes, repreſentations, and letters from ſeveral ſynods and preſbyteries, relative to the buſineſs now before the commiſſion, were received and read. The ſynods of Dumfries, Murray, Roſs, Angus and Mearns, Perth and Stirling, craved that the commiſſion would delay proceeding to a higher cenſure. The ſynods of Galloway and Fife, as alſo the preſbytery of Dornoch, addreſſed the commiſſion for lenity, tenderneſs, and forbearance, towards the ſuſpended miniſters; and the preſbytery of Aberdeen repreſented, that in their judgement, the ſentence of ſuſpenſion inflicted on the foreſaid miniſters was too high, and that it was a ſtretch of eccleſiaſtical authority. Many members of the commiſſion reaſoned in the ſame manner, and alleged that the act and ſentence of laſt aſſembly did not oblige them to proceed to an higher cenſure at this meeting of the commiſſion. The queſtion, however, was put, Proceed to an higher cenſure, or not? and the votes being numbered, were found equal on both ſides: upon which Mr John Goldie the moderator gave his caſting vote to proceed to a higher cenſure; which ſtands in their minutes in theſe words: "The commiſſion did and hereby do looſe the relation of Mr Ebenezer Erſkine miniſter at Stirling, Mr William Wilſon miniſter at Perth, Mr Alexander Moncrief miniſter at Abernethy, and Mr James Fiſher miniſter at Kinclaven, to their reſpective charges, and declare them no longer miniſters of this church; and do hereby prohibit all miniſters of this church to employ them, or any of them, in any miniſterial function. And the commiſſion do declare the churches of the ſaid miniſters vacant from and after the date of this ſentence." Seceders.

6 deprived of their livings;

This ſentence being intimated to them, they proteſted, that their miniſterial office and relation to their reſpective charges ſhould be held *as* valid as if no ſuch ſentence had paſſed; and that they were now obliged to make a *ſeceſſion* from the prevailing party in the eccleſiaſtical courts; and that it ſhall be lawful and warrantable for them to preach the goſpel, and diſcharge every branch of the paſtoral office, according to the word of God and the eſtabliſhed principles of the church of Scotland. Mr Ralph Erſkine miniſter at Dunfermline, Mr Thomas Mair miniſter at Orwel, Mr John M'Laren miniſter at Edinburgh, Mr John Currie miniſter at Kinglaſſie, Mr James Wardlaw miniſter at Dunfermline, and Mr Thomas Nairn miniſter at Abbotſhal, proteſted againſt the ſentence of the commiſſion, and that it ſhould be lawful for them to complain of it to any ſubſequent general aſſembly of the church.

The ſeceſſion properly commenced at this date. And accordingly the ejected miniſters declared in their proteſt that they were laid under the diſagreeable neceſſity of ſeceding, not from the principles and conſtitution of the church of Scotland, to which, they ſaid, they ſtedfaſtly adhered, but from the preſent church-courts, which had thrown them out from miniſterial communion. The aſſembly, however, which met in May 1734 did ſo far modify the above ſentence, that they empowered the ſynod of Perth and Stirling to receive the ejected miniſters into the communion of the church, and reſtore them to their reſpective charges; but with this expreſs direction, "that the ſaid ſynod ſhould not take upon them to judge of the legality or formality of the former procedure of the church judicatories in relation to this affair, or either approve or cenſure the ſame." As this appointment neither condemned the act of the preceding aſſembly nor the conduct of the commiſſion, the ſeceding miniſters conſidered it to be rather an act of grace than of juſtice, and therefore they ſaid they could not return to the church-courts upon this ground; and they publiſhed to the world the reaſons of their refuſal, and the terms upon which they were willing to return to the communion of the eſtabliſhed church. They now erected themſelves into an eccleſiaſtical court, which they called the *Aſſociated Preſbytery*, and preached occaſionally to numbers of the people who joined them in different parts of the country. They alſo publiſhed what they called an *Act, Declaration, and Teſtimony*, to the doctrine, worſhip, government, and diſcipline of the church of Scotland, and againſt ſeveral inſtances, as they ſaid, of defection from theſe, both in former and in the preſent times. Some time after this ſeveral miniſters of the eſtabliſhed church joined them, and the Aſſociated Preſbytery now conſiſted of eight miniſters. But the general aſſembly which met in 1738 finding that the number of Seceders was much increaſed, ordered the eight miniſters to be ſerved with a libel, and to be cited to the next meeting of the aſſembly in 1739. They now appeared at the bar as a conſtituted preſbytery, and having formally declined the aſſembly's authority, they immediately withdrew. The aſſembly which met next year depoſed them from the office of the miniſtry; which, however, they continued to exerciſe in their reſpective congregations, who ſtill adhered to them, and erected meeting houſes, where they preached till their

7 and degraded.

Seceders

their death. Mr James Fiſher, the laſt ſurvivor of them, was, by an unanimous call in 1741, tranſlated from Kinclaven to Glaſgow, where he continued in the exerciſe of his miniſtry among a numerous congregation, reſpected by all ranks in that large city, and died in 1775 much regretted by his people and friends. In 1745 the ſeceding miniſters were become ſo numerous, that they were erected into three different preſbyteries, under one ſynod, when a very unprofitable diſpute divided them into two parties.

8 They divide among themſelves about the legality of the burgeſs oath,

The burgeſs oath in ſome of the royal boroughs of Scotland contains the following clauſe: "I profeſs and allow with my heart the true religion preſently profeſſed within this realm, and authorized by the laws thereof. I will abide at and defend the ſame to my life's end, renouncing the Romiſh religion called *Papiſtry*." Meſſrs Ebenezer and Ralph Erſkine, James Fiſher, and others, affirmed that this clauſe was no way contrary to the principles on which the ſeceſſion was formed, and that therefore every Seceder might lawfully ſwear it. Meſſrs Alexander Moncrief, Thomas Mair, Adam Gib, and others, contended on the other hand that the ſwearing of the above clauſe was a virtual renunciation of their teſtimony. And this controverſy was ſo keenly agitated, that they ſplit into two different parties, and now met in different ſynods. Thoſe of them who aſſert the lawfulneſs of ſwearing the burgeſs oath are called *Burghers*, and the other party who condemn it are called *Antiburgher Seceders*. Each party claiming to itſelf the lawful conſtitution of the *Aſſociate Synod*, the Antiburghers, after ſeveral previous ſteps, excommunicated the Burghers on the ground of their ſin and of their contumacy in it. This rupture took place in 1747, ſince which period no attempts to effect a reunion have been ſucceſsful. They remain under the juriſdiction of different ſynods, and hold ſeparate communion, although much of their former hoſtility has been laid aſide. The Antiburghers conſider the Burghers as too lax and not ſufficiently ſtedfaſt to their teſtimony. The Burghers on the other hand contend that the Antiburghers are too rigid, in that they have introduced new terms of communion into the ſociety. The Antiburghers having adopted ideas with regard to what they call *covenanting*, which the Burghers never approved (A), have been in uſe of renewing in their ſeveral congregations the Scottiſh Covenant, by cauſing their people formally ſwear to maintain it. In other reſpects the differences between the two parties are not material. The Antiburghers are moſt numerous on the north of the Tay, and the Burghers on the ſouth of it.

9 and form ſeparate communions.

Seceders.

10 Hiſtory of the Burgher Seceders.

What follows in this article is a further account of thoſe who are commonly called the *Burgher Seceders*. Theſe have a greater number of people in their communion than the Antiburghers, and for ſome years paſt they have greatly increaſed in the ſouthern and weſtern diſtricts of Scotland. As there were among them from the commencement of their ſeceſſion ſeveral ſtudents who had been educated at one or other of the univerſities, they appointed one of their miniſters to give lectures in theology, and train up candidates for the miniſtry. Meſſrs William Wilſon miniſter at Perth and Alexander Moncrief miniſter at Abernethy were their profeſſors of theology before their ſeparation from the Antiburghers.

Since that period Mr Ebenezer Erſkine miniſter at Stirling, Mr James Fiſher miniſter at Glaſgow, Mr John Swanſton miniſter at Kinroſs, and Mr John Brown miniſter at Haddington, have ſucceeded each other in this office. At preſent Mr George Lawſon miniſter at Selkirk is their profeſſor of theology, and there are between thirty and forty ſtudents who attend his lectures annually. The number of their miniſters is about an hundred, and each of their congregations contains from two hundred and fifty to three thouſand perſons; and there are among them at preſent more than twenty vacant charges. Where a congregation is very numerous, as in Stirling, Dunfermline, and Perth, it is formed into a collegiate charge, and provided with two miniſters. They are erected into ſix different preſbyteries, united in one general ſynod, which commonly meets at Edinburgh in May and September (B). They have alſo a ſynod in Ireland compoſed of three or four different preſbyteries. They are legally tolerated in Ireland; and government ſome years ago granted 500l. per annum, and of late an additional 500l. which, when divided among them, affords to each miniſter about 20l. over and above the ſtipend which he receives from his hearers. Theſe have beſides a preſbytery in Nova Scotia; and ſome years ago, it is ſaid, that the Burgher and the Antiburgher miniſters reſiding in the United States formed a coalition and joined in a general ſynod, which they call the *Synod* of *New York* and *Pennſylvania*. They all preach the doctrines contained in the Weſtminſter Confeſſion of Faith and Catechiſms, as they believe theſe to be founded on the ſacred ſcriptures. They catechiſe their hearers publicly, and viſit them from houſe to houſe once every year.

(A) This is the account which the Burghers give of their own notions reſpecting the covenant. One of the moſt enlightened of their opponents, however, aſſures us that they acknowledge covenanting to be a *moral duty*, and that the ſolemn vows of our anceſtors are obligatory. But ſince the breach in the ſynod they have never engaged in this work; giving, as their reaſon, that this is not the proper ſeaſon.

(B) The conſtitution of the Antiburgher church differs very little from that of the Burghers. The ſupreme court among them is deſigned *The General Aſſociate Synod*, having under its juriſdiction three provincial ſynods in Scotland and one in Ireland. In the former country there are eleven preſbyteries; in the latter, four. They have a few congregations in England, and a preſbytery in connection with them in North America. The number of miniſters belonging to the general ſynod is a hundred and thirty-ſeven; and in Scotland there are nineteen vacancies. They, as well as the Burgher Seceders, have a profeſſor of theology, whoſe lectures every candidate for the office of a preacher is obliged to attend, we have been told, for no leſs than five or ſix ſeſſions! Surely the ſeſſion muſt be of ſhort duration.

Seceders. year. They will not give the Lord's ſupper to thoſe who are ignorant of the principles of the goſpel, nor to ſuch as are ſcandalous and immoral in their lives. They condemn private baptiſm, nor will they admit thoſe who are groſsly ignorant and profane to be ſponſors for their children. Believing that the people have a natural right to chooſe their own paſtors, the ſettlement of their miniſters always proceeds upon a popular election; and the candidate who is elected by the majority is ordained among them. Convinced that the charge of ſouls is a truſt of the greateſt importance, they carefully watch over the morals of their ſtudents, and direct them to ſuch a courſe of reading and ſtudy as they judge moſt proper to qualify them for the profitable diſcharge of the paſtoral duties. At the ordination of their miniſters they uſe a *formula* of the ſame kind with that of the eſtabliſhed church, which their miniſters are bound to ſubſcribe when called to it; and if any of them teach doctrines contrary to the Scriptures or the Weſtminſter Confeſſion of Faith, they are ſure of being thrown out of their communion. By this means uniformity of ſentiment is preſerved among them; nor has any of their miniſters, excepting one, been proſecuted for error in doctrine ſince the commencement of their ſeceſſion.

11 Their rules of faith,

They believe that the holy ſcriptures are the ſole criterion of truth, and the only rule to direct mankind to glorify and enjoy God, the chief and eternal good; and that "the Supreme Judge, by which all controverſies of religion are to be determined, and all the decrees of councils, opinions of ancient writers, doctrines of men and private ſpirits, are to be examined, and in whoſe ſentence we are to reſt, can be no other but the Holy Spirit ſpeaking in the Scriptures." They are fully perſuaded, however, that the ſtandards of public authority in the church of Scotland exhibit a juſt and conſiſtent view of the meaning and deſign of the holy ſcriptures with regard to doctrine, worſhip, government, and diſcipline; and they in ſo far differ from the diſſenters in England, in that they hold theſe ſtandards to be not only articles of peace and a teſt of orthodoxy, but as a bond of union and fellowſhip. They conſider a ſimple declaration of adherence to the ſcriptures as too equivocal a proof of unity in ſentiment, becauſe Arians, Socinians, and Arminians, make ſuch a confeſſion of their faith, while they retain ſentiments which they (the Seceders) apprehend are ſubverſive of the great doctrines of the goſpel. They believe that Jeſus Chriſt is the only King and Head of the Church, which is his body; that it is his ſole prerogative to enact laws for the government of his kingdom, which is not of this world; and that the church is not poſſeſſed of a legiſlative, but only of an executive power, to be exerciſed in explaining and applying to their proper objects and ends thoſe laws which Chriſt hath publiſhed in the ſcriptures. Thoſe doctrines which they teach relative to faith and practice are exhibited at great length in an explanation of the Weſtminſter Aſſembly's Shorter Catechiſm, by way of queſtion and anſwer, in two volumes, compoſed chiefly by Mr James Fiſher late of Glaſgow, and publiſhed by deſire of their ſynod.

For theſe 50 years paſt, the grounds of their ſeceſſion, they allege, have been greatly enlarged by the public adminiſtrations of the eſtabliſhed church, and particularly by the uniform execution of the law reſpecting patronage, which, they ſay, has obliged many thouſands of private Chriſtians to withdraw from the pariſh-churches and join their ſociety. Seceders.

It is certain, however, that their number has rapidly increaſed of late, eſpecially in the large cities of the kingdom. They have three different congregations in Edinburgh, two in Glaſgow, and two in London, beſides ſeveral others in the north of England. In moſt of their congregations they celebrate the Lord's ſupper twice in the year, and they catechiſe their young people concerning their knowledge of the principles of religion previouſly to their admiſſion to that ſacrament. When any of them fall into the ſin of fornication or adultery, the ſcandal is regularly purged according to the form of proceſs in the eſtabliſhed church; and thoſe of the delinquents who do not ſubmit to adequate cenſure are publicly declared to be fugitives from diſcipline, and are expelled the ſociety. They never accept a ſum of money as a commutation for the offence. They condemn all clandeſtine and irregular marriages, nor will they marry any perſons unleſs they have been proclaimed in the pariſh-church on two different Lord's days at leaſt.

12 and political principles.

When they ſeparated from the eſtabliſhed church, they remained firm in their attachment to the ſtate; and they were not many years formed into a diſtinct ſociety, when they expelled from their communion a Mr Thomas Nairn miniſter at Kirkcaldy, who had taught doctrines inimical to the civil government of the nation. In 1745 there was not one of their number who joined the pretender to the Britiſh crown. They are ſtill of the ſame ſentiments; and in their public aſſemblies they always pray for our ſovereign King George, with the royal family, and for all who are in authority under them. They are ſo far from wiſhing the overthrow of the preſent civil government, that when the nation was lately in danger of being thrown into a fermentation by the circulation of inflammatory and ſeditious writings, they warmly recommended peace and order in ſociety. The ſame remarks, we believe, are equally applicable to the Antiburgher ſeceders. No legal diſqualifications, as in the caſe of the diſſenters in England, exclude them from any place of public truſt in the municipal government of the country; and ſome of them are frequently in the magiſtracy of the royal boroughs. They are not, however, legally tolerated, but are ſupported by the mildneſs of adminiſtration and the liberal ſpirit of the times. Avowing their adherence to the doctrines contained in the public ſtandards of the church of Scotland, together with the preſbyterian form of government, from which they never intended to ſecede, they deny that they are either ſchiſmatics or ſectaries, as they have been frequently called: and when they withdrew from the eccleſiaſtical courts, they did not, they ſay, conſtitute a church of their own, different from the national church, but profeſs to be a part of that church, endeavouring to hold by her reformed principles, in oppoſition to thoſe deviations from them which they have ſpecified in their *Act and Teſtimony*.

13 Their moderation.

Moſt of them live in habits of friendſhip and intimacy with their brethren of the eſtabliſhment, and they profeſs an affectionate regard for all thoſe of every denomination who love Jeſus Chriſt in ſincerity and truth. In the late re-exhibition of their teſtimony, they have declared to the world, that, were the grounds of their ſeceſſion happily removed, they would account it one of the moſt ſingular felicities of their

Sechium ‖ Secker.

their time to return with pleaſure to the communion of the eſtabliſhed church.

SECHIUM, a genus of plants belonging to the monœcia claſs; and in the natural method ranking under the 34th order, *Cucurbitaceæ*. See BOTANY *Index*.

SECKENDORF, GUY LEWIS DE, a very learned German, deſcended from an ancient and noble family, was born at Aurach in Franconia in 1626. He was a good linguiſt, learned in law, hiſtory, and divinity; and is ſaid to have been a tolerable painter and engraver. He was honourably employed by ſeveral of the German princes; and died counſellor of ſtate to Frederic III. elector of Brandenburg, and chancellor of the univerſity of Halle, in 1692. He wrote many books, particularly "A hiſtory and defence of the Lutheran religion," 2 vols folio, Frankfort, 1602, in Latin.

SECKER, THOMAS, a learned and reſpectable prelate of the church of England, was born, in 1693, at a village called *Sibthorp*, in the vale of Belvoir, in Nottinghamſhire. His father was a Proteſtant diſſenter, a pious, virtuous, and ſenſible man; who, having a ſmall paternal fortune, followed no profeſſion. His mother was the daughter of Mr Brough, a ſubſtantial gentleman farmer of Shelton in the ſame county. He received his education at ſeveral private ſchools and academies in the country, being obliged, by various accidents, frequently to change his maſters.

Notwithſtanding this diſadvantage, he had at the age of 19 not only made conſiderable progreſs in Greek and Latin, and read the beſt writers in both languages, but had acquired a knowledge of French, Hebrew, Chaldee, and Syriac; had learned geography, logic, algebra, geometry, conic ſections, and gone through a courſe of lectures on Jewiſh antiquities and other points, preparatory to the critical ſtudy of the Bible. He had been deſtined by his father for orders among the Diſſenters. With this view, during the latter years of his education, his ſtudies were chiefly turned towards divinity, in which he had made ſuch quick advances, that by the time he was 23 he had carefully read over a great part of the Scriptures, particularly the New Teſtament, in the original, and the beſt comments upon it; Euſebius's Eccleſiaſtical Hiſtory, The Apoſtolical Fathers, Whiſton's Primitive Chriſtianity, and the principal writers for and againſt Miniſterial and Lay Conformity.—But though the reſult of theſe inquiries was a well-grounded belief of the Chriſtian revelation, yet not being at that time able to decide on ſome abſtruſe ſpeculative doctrines, nor to determine abſolutely what communion he ſhould embrace; he reſolved, like a wiſe and honeſt man, to purſue ſome profeſſion, which ſhould leave him at liberty to weigh thoſe things more maturely in his thoughts, and not oblige him to declare or teach publicly opinions which were not yet thoroughly ſettled in his own mind.

In 1716, therefore, he applied himſelf to the ſtudy of phyſic, and after gaining all the medical knowledge he could, by reading the uſual preparatory books, and attending the beſt lectures during that and the following winter in London, in order to improve himſelf farther, in January 1718-19 he went to Paris. There he lodged in the ſame houſe with the famous anatomiſt Mr Winſlow, whoſe lectures he attended, as he did thoſe of the materia medica, chemiſtry, and botany, at the king's gardens. He ſaw the operations of ſurgery at the *Hotel Dieu*, and attended alſo for ſome time M. Gregoire, the accoucheur, but without any deſign of ever practiſing that or any other branch of ſurgery. Here he became acquainted with Mr Martin Benſon, afterwards biſhop of Glouceſter, one of the moſt agreeable and virtuous men of his time; with whom he quickly became much connected, and not many years after was united to him by the ſtricteſt bonds of affinity as well as affection. Secker.

During the whole of Mr Secker's continuance at Paris, he kept up a conſtant correſpondence with Mr Joſeph Butler, afterwards biſhop of Durham, with whom he became acquainted at the academy of one Mr Jones, kept firſt at Glouceſter, and afterward at Tewkſbury. Mr Butler having been appointed preacher at the Rolls on the recommendation of Dr Clarke and Mr Edward Talbot, ſon to Biſhop Talbot, he now took occaſion to mention his friend Mr Secker, without Secker's knowledge, to Mr Talbot, who promiſed, in caſe he choſe to take orders in the church of England, to engage the biſhop his father to provide for him. This was communicated to Mr Secker in a letter from Mr Butler about the beginning of May 1720. He had not at that time come to any reſolution of quitting the ſtudy of phyſic; but he began to foreſee many obſtacles to his purſuing that profeſſion; and having never diſcontinued his application to theology, his former difficulties both with regard to conformity and ſome other doubtful points had gradually leſſened, as his judgement became ſtronger, and his reading and knowledge more extenſive. It appears alſo from two of his letters ſtill in being, written from Paris to a friend in England, (both of them prior to the date of Mr Butler's above mentioned), that he was greatly diſſatisfied with the diviſions and diſturbances which at that particular period prevailed among the Diſſenters.

In this ſtate of mind Mr Butler's unexpected propoſal found him; which he was therefore very well diſpoſed to take into conſideration; and after deliberating on the ſubject of ſuch a change for upwards of two months, he reſolved at length to embrace the offer, and for that purpoſe quitted France about the beginning of Auguſt 1720.

On his arrival in England, he was introduced to Mr Talbot, with whom he cultivated a cloſe acquaintance; but it was unfortunately of very ſhort duration; for in the month of December that gentleman died of the ſmallpox. This was a great ſhock to all his friends, who had juſtly conceived the higheſt expectations of him; but eſpecially to an amiable lady whom he had lately married, and who was very near ſinking under ſo ſudden and grievous a ſtroke. Mr Secker, beſide ſharing largely in the common grief, had peculiar reaſon to lament an accident that ſeemed to put an end to all his hopes; but he had taken his reſolution, and he determined to perſevere. It was ſome encouragement to him to find that Mr Talbot had, on his deathbed, recommended him, together with Mr Benſon and Mr Butler, to his father's notice. Thus did that excellent young man (for he was but 29 when he died), by his nice diſcernment of characters, and his conſiderate good nature, provide moſt effectually, in a few ſolemn moments, for the welfare of that church from which he himſelf was ſo prematurely ſnatched away; and at the

Secker. fame time raiſed up, when he leaſt thought of it, the trueſt friend and protector to his wife and unborn daughter; who afterwards found in Mr Secker all that tender care and aſſiſtance which they could have hoped for from the neareſt relation.

It being judged neceſſary by Mr Secker's friends that he ſhould have a degree at Oxford; and having been informed, that if he ſhould previouſly take the degree of Doctor in Phyſic at Leyden, it would probably help him in obtaining the other, he went over and took his degree there in March 1721: and, as part of his exerciſe for it, he compoſed and printed a diſſertation *de Medicina Statica*, which is ſtill extant, and is thought by the gentlemen of that profeſſion to be a ſenſible and learned performance.

In April the ſame year, he entered himſelf a gentleman commoner of Exeter college, Oxford; after which he obtained the degree of Bachelor of Arts, in conſequence of the chancellor's recommendatory letter to the convocation.

He now ſpent a conſiderable part of his time in London, where he quickly gained the eſteem of ſome of the moſt learned and ingenious men of thoſe days, particularly of Dr Clarke, rector of St James's, and the celebrated Dean Berkeley, afterwards biſhop of Cloyne, with whom he every day became more delighted, and more cloſely connected. He paid frequent viſits of gratitude and friendſhip to Mrs Talbot, widow of Mr Edward Talbot, by whom ſhe had a daughter five months after his deceaſe. With her lived Mrs Catharine Benſon, ſiſter to Biſhop Benſon, whom in many reſpects ſhe greatly reſembled. She had been for ſeveral years Mrs Talbot's inſeparable companion, and was of unſpeakable ſervice to her at the time of her huſband's death, by exerting all her courage, activity, and good ſenſe (of which ſhe poſſeſſed a large ſhare), to ſupport her friend under ſo great an affliction, and by afterwards attending her ſickly infant with the utmoſt care and tenderneſs, to which, under Providence, was owing the preſervation of a very valuable life.

Biſhop Talbot being in 1721 appointed to the ſee of Durham, Mr Secker was in 1722 ordained deacon by him in St James's church, and prieſt not long after in the ſame place, where he preached his firſt ſermon March 28. 1723. The biſhop's domeſtic chaplain at that time was Dr Rundle, a man of warm fancy and very brilliant converſation, but apt ſometimes to be carried by the vivacity of his wit into indiſcreet and ludicrous expreſſions, which created him enemies, and, on one occaſion, produced diſagreeable conſequences.—With him Mr Secker was ſoon after aſſociated in the biſhop's family, and both taken down by his lordſhip to Durham in July 1723.

In the following year the biſhop gave Mr Secker the rectory of Houghton-le-Spring. This preferment putting it in his power to fix himſelf in the world, in a manner agreeable to his inclinations, he ſoon after made a propoſal of marriage to Mrs Benſon; which being accepted, they were married by Biſhop Talbot in 1725. At the earneſt requeſt of both, Mrs Talbot and her daughter conſented to live with them, and the two families from that time became one.

About this time Biſhop Talbot alſo gave preferments to Mr Butler and Mr Benſon, whoſe riſe and progreſs in the church is here interwoven with the hiſtory of Mr Secker. In the winter of 1725-6, Mr Butler firſt Secker. publiſhed his incomparable ſermons; on which, as Dr Beilby Porteous and Dr Stinton inform us, Mr Secker took pains to render the ſtyle more familiar, and the author's meaning more obvious: yet they were at laſt by many called obſcure. Mr Secker gave his friend the ſame aſſiſtance in that noble work the Analogy of Religion, &c.

He now gave up all the time he poſſibly could to his reſidence at Houghton, applying himſelf with alacrity to all the duties of a country clergyman, and ſupporting that uſeful and reſpectable character throughout with the ſtricteſt propriety. He omitted nothing which he thought would be of uſe to the ſouls and bodies of the people entruſted to his care. He brought down his converſation and his ſermons to the level of their underſtandings; he viſited them in private, he catechiſed the young and ignorant, he received his country neighbours and tenants very kindly and hoſpitably, and was of great ſervice to the poorer ſort of them by his ſkill in phyſic, which was the only uſe he ever made of it. Though this place was in a very remote part of the world, yet the ſolitude of it perfectly ſuited his ſtudious diſpoſition, and the income ariſing from it bounded his ambition. Here he would have been content to live and die; here, as he has often been heard to declare, he ſpent ſome of the happieſt hours of his life; and it was no thought or choice of his own that removed him to a higher and more conſpicuous ſituation; but Mrs Secker's health, which now began to decline, and was thought to be injured by the dampneſs of the ſituation, obliged him to think of exchanging it for a more healthy one. Accordingly, an exchange was made through the friendly interpoſition of Mr Benſon (who generouſly ſacrificed his own intereſt on this occaſion, by relinquiſhing a prebend of his own to ſerve his friend) with Dr Finney, prebendary of Durham, and rector of Ryton; and Mr Secker was inſtituted to Ryton and the prebend June 3. 1727. For the two following years he lived chiefly at Durham, going every week to officiate at Ryton, and ſpending there two or three months together in the ſummer.

In July 1732 he was appointed chaplain to the king; for which favour he was indebted to Dr Sherlock, who having heard him preach at Bath, had conceived the higheſt opinion of his abilities, and thought them well worthy of being brought forward into public notice. From that time an intimacy commenced between them, and he received from that great prelate many ſolid proofs of eſteem and friendſhip.

His month of waiting at St James's happened to be Auguſt, and on Sunday the 27th of that month he preached before the queen, the king being then abroad. A few days after, her majeſty ſent for him into her cloſet, and held a long converſation with him; in the courſe of which he took an opportunity of mentioning to her his friend Mr Butler. He alſo, not long after this, on Mr Talbot's being made lord chancellor, found means to have Mr Butler effectually recommended to him for his chaplain. The queen alſo appointed him clerk of her cloſet; from whence he roſe, as his talents became more known, to thoſe high dignities which he afterwards attained.

Mr Secker now began to have a public character, and ſtood high in the eſtimation of thoſe who were allowed

Secker. lowed to be the beſt judges of merit: he had already given proofs of abilities that plainly indicated the eminence to which he muſt one day riſe, as a preacher and a divine; and it was not long before an opportunity offered of placing him in an advantageous point of view. Dr Tyrrwhit, who ſucceeded Dr Clarke as rector of St James's in 1729, found that preaching in ſo large a church endangered his health. Biſhop Gibſon, therefore, his father-in-law, propoſed to the crown that he ſhould be made reſidentiary of St Paul's, and that Mr Secker ſhould ſucceed him in the rectory. This arrangement was ſo acceptable to thoſe in power, that it took place without any difficulty. Mr Secker was inſtituted rector the 18th of May 1733; and in the beginning of July went to Oxford to take his degree of Doctor of Laws, not being of ſufficient ſtanding for that of divinity. On this occaſion it was that he preached his celebrated Act Sermon, on the advantages and duties of academical education, which was univerſally allowed to be a maſterpiece of ſound reaſoning and juſt compoſition: it was printed at the deſire of the heads of houſes, and quickly paſſed through ſeveral editions. It is now to be found in the ſecond collection of Occaſional Sermons, publiſhed by himſelf in 1766.

It was thought that the reputation he acquired by this ſermon, contributed not a little toward that promotion which very ſoon followed its publication. For in December 1734, he received a very unexpected notice from Biſhop Gibſon, that the king had fixed on him to be biſhop of Briſtol. Dr Benſon was about the ſame time appointed to the ſee of Glouceſter, as was Dr Fleming to that of Carliſle; and the three new biſhops were all conſecrated together in Lambeth Chapel, Jan. 19. 1734-5, the conſecration-ſermon being preached by Dr Thomas, afterwards biſhop of Wincheſter.

The honours to which Dr Secker was thus raiſed in the prime of life did not in the leaſt abate his diligence and attention to buſineſs; for which, indeed, there was now more occaſion than ever. His learned biographers, Meſſrs Porteous and Stinton, now relate the manner in which he ſet about the viſitation of his dioceſe, and the ceremony of confirmation, which he performed in a great number of places; he alſo preached in ſeveral churches, ſometimes twice a-day. The affairs of his pariſh of St James's being likewiſe in great diſorder, he took extraordinary pains to regulate and adjuſt every thing, particularly the management of the poor; and thus even in a temporal view became of ſignal ſervice to his pariſhioners. But, ſay our authors, "it was their ſpiritual welfare which engaged, as it ought to do, his chief attention. As far as the circumſtances of the times, and the populouſneſs of that part of the metropolis allowed, he omitted not even thoſe private admonitions and perſonal applications which are often attended with the happieſt effects. He allowed out of his own income a ſalary for reading early and late prayers, which had formerly been paid out of the offertory money. He held a confirmation once every year, examined the candidates ſeveral weeks before in the veſtry, and gave them religious tracts, which he alſo diſtributed at other times very liberally to thoſe that needed them. He drew up, for the uſe of his pariſhioners, that admirable courſe of *Lectures on the Church Catechiſm* which hath been lately publiſhed, and not only read them once every week on the uſual days, but alſo every Sunday evening, either at the church or one of the chapels belonging to it." Secker.

The ſermons which at the ſame time, we are told, he ſet himſelf to compoſe, "were truly excellent and original. His faculties were now in their full vigour, and he had an audience to ſpeak before that rendered the utmoſt exertion of them neceſſary. He did not, however, ſeek to gratify the higher part, by amuſing them with refined ſpeculations, or ingenious eſſays, unintelligible to the lower part, and unprofitable to both; but he laid before them all, with equal freedom and plainneſs, the great Chriſtian duties belonging to their reſpective ſtations, and reproved the follies and vices of every rank among them, without diſtinction or palliation. He ſtudied human nature thoroughly in all its various forms, and knew what ſort of arguments would have moſt weight with each claſs of men. He brought the ſubject home to their boſoms, and did not ſeem to be merely ſaying uſeful things in their preſence, but addreſſing himſelf perſonally to every one of them. Few ever poſſeſſed, in a higher degree, the rare talent of touching on the moſt delicate ſubjects with the niceſt propriety and decorum, of ſaying the moſt familiar things without being low, the plaineſt without being feeble, the boldeſt without giving offence. He could deſcend with ſuch ſingular eaſe and felicity into the minuteſt concerns of common life, could lay open with ſo much addreſs the various workings, artifices, and evaſions of the human mind, that his audience often thought their own particular caſes alluded to, and heard with ſurpriſe their private ſentiments and feelings, their ways of reaſoning and principles of acting, exactly ſtated and deſcribed. His preaching was, at the ſame time, highly rational, and truly evangelical. He explained with perſpicuity, he aſſerted with dignity, the peculiar characteriſtic doctrines of the goſpel. He inculcated the utility, the neceſſity of them, not merely as ſpeculative truths, but as actual inſtruments of moral goodneſs, tending to purify the hearts and regulate the lives of men; and thus, by God's gracious appointment, as well as by the inſeparable connection between true faith and right practice, leading them to ſalvation.

"Theſe important truths he taught with the authority, the tenderneſs, the familiarity, of a parent inſtructing his children. Though he neither poſſeſſed nor affected the artificial eloquence of an orator who wants to amuſe or to miſlead, yet he had that of an honeſt man who wants to convince, of a Chriſtian preacher who wants to reform and to ſave thoſe that hear him. Solid argument, manly ſenſe, uſeful directions, ſhort, nervous, ſtriking ſentences, awakening queſtions, frequent and pertinent applications of ſcripture; all theſe following each other in quick ſucceſſion, and coming evidently from the ſpeaker's heart, enforced by his elocution, his figure, his action, and above all, by the correſponding ſanctity of his example, ſtamped conviction on the minds of his hearers, and ſent them home with impreſſions not eaſy to be effaced. It will readily be imagined that with theſe powers he quickly became one of the moſt admired and popular preachers of his time."

In 1737 he ſucceeded to the ſee of Oxford, on the promotion of Dr Potter to that of Canterbury, then vacant by the death of Archbiſhop Wake.

In the ſpring of 1748, Mrs Secker died of the gout in her ſtomach. She was a woman of great ſenſe and

Secker. merit, but of a weak and ſickly conſtitution. The biſhop's affection and tenderneſs for her was ſuited to his character. In 1750, he was inſtalled dean of St Paul's, for which he gave in exchange the rectory of St James's and his prebend of Durham. "It was no wonder (ſay our authors) that, after preſiding over ſo extenſive and populous a pariſh for upwards of 17 years, he ſhould willingly conſent to be releaſed from a burden which began now to grow too great for his ſtrength. When he preached his farewel ſermon, the whole audience melted into tears: he was followed with the prayers and good wiſhes of thoſe whom every honeſt man would be moſt ambitious to pleaſe; and there are numbers ſtill living who retain a ſtrong and grateful remembrance of his inceſſant and tender ſolicitude for their welfare. Having now more leiſure both to proſecute his own ſtudies and to encourage thoſe of others, he gave Dr Church conſiderable aſſiſtance in his *Firſt and Second Vindication of the Miraculous Powers*, &c. againſt Dr Middleton, and he was of equal uſe to him in his *Analyſis of Lord Bolingbroke's Works*. About the ſame time began the late Archdeacon Sharp's controverſy with the followers of Mr Hutchinſon, which was carried on to the end of the year 1755." Biſhop Secker, we are told, read over all Dr Sharp's papers, amounting to three volumes 8vo, and corrected and improved them throughout. But the eaſe which this late change of ſituation gave him was ſoon diſturbed by a heavy and unexpected ſtroke, the loſs of his three friends, Biſhops Butler, Benſon, and Berkeley, who were all cut off within the ſpace of one year.

Our authors next give an account of the part which Dr Secker bore, in the houſe of lords, in reſpect to the famous repeal of the Jew bill; for which the duke of Newcaſtle moved, and was ſeconded by the Biſhop, in a ſpeech which, we are told, was remarkably well received. At length his diſtinguiſhed merit prevailed over all the political obſtacles to his advancement, and placed him, without any efforts or application of his own, in that important ſtation which he had ſhown himſelf ſo well qualified to adorn. On the death of Archbiſhop Hutton, he was promoted to the ſee of Canterbury, and was confirmed at Bow-church, April 21. 1758; on which occaſion our authors obſerve, that in accepting this high and burdenſome ſtation, Dr Secker acted on that principle which influenced him through life; that he ſacrificed his own eaſe and comfort to conſiderations of public utility; that the mere ſecular advantages of grandeur were objects below his ambition; and were, as he knew and felt, but poor compenſations for the anxiety and difficulties attending them. He had never once through his whole life aſked preferment for himſelf, nor ſhown any unbecoming eagerneſs for it; and the uſe he made of his newly acquired dignity very clearly ſhowed, that rank, and wealth, and power, had in no other light any charms for him, than as they enlarged the ſphere of his active and induſtrious benevolence.

He ſought out and encouraged men of real genius or extenſive knowledge; he expended 300l. in arranging and improving the manuſcript library at Lambeth; and obſerving with concern, that the library of printed books in that palace had received no additions ſince the time of Archbiſhop Tenniſon, he made it his buſineſs to collect books in all languages from moſt parts of Europe at a very great expence, with a view of ſupplying that chaſm; which he accordingly did, by leaving them to the library at his death, and thereby rendered that collection one of the nobleſt and moſt uſeful in the kingdom. Secker.

All deſigns and inſtitutions which tended to advance good morals and true religion, he patronized with zeal and generoſity: he contributed largely to the maintenance of ſchools for the poor; to rebuilding or repairing parſonage houſes and places of worſhip; and gave no leſs than 600l. towards erecting a chapel in the pariſh of Lambeth. To the ſociety for promoting Chriſtian knowledge he was a liberal benefactor; and to that for propagating the goſpel in foreign parts, of which he was the preſident, he paid much attention; was conſtant at all the meetings of its members, even ſometimes when his health would but ill permit, and ſuperintended their deliberations with conſummate prudence and temper.

Whenever any publications came to his knowledge that were manifeſtly calculated to corrupt good morals, or ſubvert the foundations of Chriſtianity, he did his utmoſt to ſtop the circulation of them; yet the wretched authors themſelves he was ſo far from wiſhing to treat with any undue rigour, that he has more than once extended his bounty to them in diſtreſs. And when their writings could not properly be ſuppreſſed (as was too often the caſe) by lawful authority, he engaged men of abilities to anſwer them, and rewarded them for their trouble. His attention was everywhere. Even the falſehoods and miſrepreſentation of writers in the newſpapers, on religious or eccleſiaſtical ſubjects, he generally took care to have contradicted; and when they ſeemed likely to injure, in any material degree, the cauſe of virtue and religion, or the reputation of eminent and worthy men, he would ſometimes take the trouble of anſwering them himſelf. One inſtance of this kind, which does him honour, and deſerves mention, was his defence of Biſhop Butler, who, in a pamphlet publiſhed in 1767, was accuſed of having died a Papiſt. The conduct which he obſerved towards the ſeveral diviſions and denominations of Chriſtians in this kingdom was ſuch as ſhowed his way of thinking to be truly liberal and catholic. The dangerous ſpirit of popery, indeed, he thought ſhould always be kept under proper legal reſtraints, on account of its natural oppoſition not only to the religious but the civil rights of mankind. He therefore obſerved its movements with care, and exhorted his clergy to do the ſame, eſpecially thoſe who were ſituated in the midſt of Roman Catholic families; againſt whoſe influence they were charged to be upon their guard, and were furniſhed with proper books or inſtructions for that purpoſe. He took all fit opportunities of combating the errors of the church of Rome in his own writings (A); and the beſt anſwers that were publiſhed to ſome of the late bold apologies for popery were written at his inſtance, and under his direction.

With

(A) See particularly his ſermons on the rebellion in 1745; on the Proteſtant working ſchools in Ireland; on the 5th

Secker. With the Diſſenters his Grace was ſincerely deſirous of cultivating a good underſtanding. He conſidered them, in general, as a conſcientious and valuable claſs of men. With ſome of the moſt eminent of them, Watts, Doddridge, Leland, Chandler, Lardner, he maintained an intercourſe of friendſhip or civility. By the moſt candid and conſiderate part of them he was highly reverenced and eſteemed; and to ſuch among them as needed help he ſhowed no leſs kindneſs and liberality than to thoſe of his own communion.

Nor was his concern for the Proteſtant cauſe confined to his own country. He was well known as the great patron and protector of it in various parts of Europe; from whence he had frequent applications for aſſiſtance, which never failed of being favourably received. To ſeveral foreign Proteſtants he allowed penſions, to others he gave occaſional relief, and to ſome of their univerſities was an annual benefactor.

In public affairs, his Grace acted the part of an honeſt citizen, and a worthy member of the Britiſh legiſlature. From his firſt entrance into the houſe of peers, his parliamentary conduct was uniformly upright and noble. He kept equally clear from the extremes of factious petulance and ſervile dependence; never wantonly thwarting adminiſtration from motives of party zeal or private pique, or perſonal attachment, or a paſſion for popularity; nor yet going every length with every miniſter from views of intereſt or ambition. He admired and loved the conſtitution of his country, and wiſhed to preſerve it unaltered and unimpaired. So long as a due regard to this was maintained, he thought it his duty to ſupport the meaſures of government; but whenever they were evidently inconſiſtent with the public welfare, he oppoſed them with freedom and firmneſs. Yet his oppoſition was always tempered with the utmoſt fidelity, reſpect, and decency, to the excellent prince upon the throne; and the moſt candid allowances for the unavoidable errors and infirmities even of the very beſt miniſters, and the peculiarly difficult ſituation of thoſe who govern a free and high-ſpirited people. He ſeldom ſpoke in parliament, except where the intereſts of religion and virtue ſeemed to require it; but whenever he did, he ſpoke with propriety and ſtrength, and was heard with attention and deference. Though he never attached himſelf blindly to any ſet of men, yet his chief political connections were with the late duke of Newcaſtle and Lord Chancellor Hardwicke. To theſe he principally owed his advancement; and he had the good fortune to live long enough to ſhow his gratitude to them or their deſcendants.

For more than ten years, during which Dr Secker enjoyed the ſee of Canterbury, he reſided conſtantly at his archiepiſcopal houſe at Lambeth. A few months before his death, the dreadful pains he felt had compelled him to think of trying the Bath waters: but that deſign was ſtopped by the fatal accident which put an end to his life.

His Grace had been for many years ſubject to the gout, which, in the latter part of his life, returned with more frequency and violence, and did not go off in a regular manner, but left the parts affected for a long time very weak, and was ſucceeded by pains in different parts of the body. About a year and a half before he died, after a fit of the gout, he was attacked with a pain in the arm, near the ſhoulder, which having continued about 12 months, a ſimilar pain ſeized the upper and outer part of the oppoſite thigh, and the arm ſoon became eaſier. This was much more grievous than the former, as it quickly diſabled him from walking, and kept him in almoſt continual torment, except when he was in a reclining poſition. During this time he had two or three fits of the gout; but neither the gout nor the medicines alleviated theſe pains, which, with the want of exerciſe, brought him into a general bad habit of body. Secker.

On Saturday July 30. 1768, he was ſeized, as he ſat at dinner, with a ſickneſs at his ſtomach. He recovered before night; but the next evening, while his phyſicians were attending, and his ſervants raiſing him on his couch, he ſuddenly cried out that his thigh-bone was broken. The ſhock was ſo violent, that the ſervants perceived the couch to ſhake under him, and the pain ſo acute and unexpected, that it overcame the firmneſs he ſo remarkably poſſeſſed. He lay for ſome time in great agonies; but when the ſurgeons arrived, and diſcovered with certainty that the bone was broken, he was perfectly reſigned, and never afterwards aſked a queſtion about the event. A fever ſoon enſued. On Tueſday he became lethargic, and continued ſo till about five o'clock on Wedneſday afternoon, when he expired with great calmneſs, in the 75th year of his age.

On examination, the thigh-bone was found to be carious about four inches in length, and at nearly the ſame diſtance from its head. The diſeaſe took its riſe from the internal part of the bone, and had ſo entirely deſtroyed its ſubſtance, that nothing remained at the part where it was broken but a portion of its outward integument; and even this had many perforations, one of which was large enough to admit two fingers, and was filled with a fungous ſubſtance ariſing from within the bone. There was no appearance of matter about the caries, and the ſurrounding parts were in a ſound ſtate. It was apparent that the torture which he underwent during the gradual corroſion of this bone muſt have been inexpreſſibly great. Out of tenderneſs to his family he ſeldom made any complaints to them, but to his phyſicians he frequently declared his pains were ſo excruciating, that unleſs ſome relief could be procured he thought it would be impoſſible for human nature to ſupport them long. Yet he bore them for upwards of ſix months with aſtoniſhing patience and fortitude; ſat up generally the greater part of the day, admitted his particular friends to ſee him, mixed with his family at the uſual hours, ſometimes with his uſual cheerfulneſs; and, except ſome very ſlight defects of memory, retained all his faculties and ſenſes in their full vigour till within a few days of his death. He was buried, purſuant

5th of November; and a great number of occaſional paſſages to the ſame purpoſe, in various parts of his lectures, ſermons, and other works.

Secker || Second.

suant to his own directions, in a covered paſſage, leading from a private door of the palace to the north door of Lambeth church; and he forbade any monument or epitaph to be placed over him.

By his will he appointed the Rev. Dr Daniel Burton, canon of Chriſt-church, and Mrs Catherine Talbot, already mentioned in the courſe of theſe memoirs, his executors; and left 13,000l. in truſt to the Drs Porteous and Stinton, his chaplains; to pay the intereſt thereof to Mrs Talbot and her daughter during their joint lives, or the life of the ſurvivor; and after the deceaſe of both thoſe ladies, 11,000l. of the ſaid 13,000l. are to be transferred to charitable purpoſes; amongſt which are 1000l. to the Society for the Propagation of the Goſpel, and 1000l. to the ſame ſociety for a biſhop or biſhops in the king's dominions in America.

The following deſcription is given of his perſon: He was tall and comely; in the early part of his life ſlender, and rather conſumptive; but as he advanced in years his conſtitution gained ſtrength, and his ſize increaſed, yet never to a degree of corpulency that was diſproportionate or troubleſome.

The dignity of his form correſponded with the greatneſs of his mind, and inſpired at all times reſpect and awe; but peculiarly ſo when he was engaged in any of the more ſolemn functions of religion, into which he entered with ſuch devout earneſtneſs and warmth, with ſo juſt a conſciouſneſs of the place he was in, and the buſineſs he was about, as ſeemed to raiſe him above himſelf, and added new life and ſpirit to the natural gracefulneſs of his appearance.

His countenance was open, ingenious, and expreſſive of every thing right. It varied eaſily with his ſpirits and his feelings, ſo as to be a faithful interpreter of his mind, which was incapable of the leaſt diſſimulation. It could ſpeak dejection, and, on occaſion, anger, very ſtrongly; but when it meant to ſhow pleaſure or approbation, it ſoftened into a moſt gracious ſmile, and diffuſed over all his features the moſt benevolent and reviving complacency that can be imagined.

SECOND, in *Geometry*, *Chronology*, &c. the 60th part of a prime or minute, whether of a degree or of an hour.

SECOND, in *Muſic*, one of the muſical intervals; being only the difference between any ſound and the next neareſt ſound, whether above or below it.

SECOND Major, in *Muſic*. See INTERVAL.

SECOND Minor, in *Muſic*. See INTERVAL.

SECOND Sight, in Erſe called *Taiſch*, is a mode of ſeeing ſuperadded to that which nature generally beſtows. This gift or faculty, which is neither voluntary nor conſtant, is in general rather troubleſome than agreeable to the poſſeſſors of it, who are chiefly found among the inhabitants of the Highlands of Scotland, thoſe of the Weſtern iſles, of the iſle of Man, and of Ireland. It is an impreſſion made either by the mind upon the eye, or by the eye upon the mind, by which things diſtant or future are perceived, and ſeen as if they were preſent. A man on a journey far from home falls from his horſe; another, who is perhaps at work about the houſe, ſees him bleeding on the ground, commonly with a landſcape of the place where the accident befals him. Another ſeer, driving home his cattle, or wandering in idleneſs, or muſing in the ſunſhine, is ſuddenly ſurpriſed by the appearance of a bridal ceremony, or funeral proceſſion, and counts the mourners or attendants, of whom, if he knows them, he relates the names; if he knows them not, he can deſcribe the dreſſes. Things diſtant are ſeen at the inſtant they happen. Second.

Of things future, Johnſon ſays that he knows no rule pretended to for determining the time between the ſight and the event; but we are informed by Mr Groſe, that in general the time of accompliſhment bears ſome relation to the time of the day in which the impreſſions are received. Thus viſions ſeen early in the morning (which ſeldom happens) will be much ſooner accompliſhed than thoſe appearing at noon; and thoſe ſeen at noon will take place in a much ſhorter time than thoſe happening at night; ſometimes the accompliſhment of the laſt does not fall out within a year or more.

Theſe viſions are not confined to ſolemn or important events; nor is it true, as is commonly reported, that to the ſecond ſight nothing is preſented but phantoms of evil. The future viſit of a mountebank, or piper; a plentiful draught of fiſh; the arrival of common travellers; or, if poſſible, ſtill more trifling matters than theſe, —are foreſeen by the ſeers. A gentleman told Dr Johnſon, that when he had once gone far from his own iſland, one of his labouring ſervants predicted his return, and deſcribed the livery of his attendant, which he had never worn at home; and which had been, without any previous deſign, occaſionally given him.

As many men eminent for ſcience and literature have admitted the reality of this apparently uſeleſs gift, we ſhall, without interpoſing our own opinion, give the reflections of two of the firſt characters of the age upon it, and leave our readers to form their own judgment. By Dr Beattie of Aberdeen it is thus accounted for.

The Highlands of Scotland are a pictureſque but a melancholy country. Long tracts of mountainous deſert, covered with dark heath, and often obſcured by miſty weather; narrow valleys, thinly inhabited, and bounded by precipices reſounding with the fall of torrents; a ſoil ſo rugged, and a climate ſo dreary, as in many parts to admit neither the amuſements of paſturage nor the labours of agriculture; the mournful daſhing of waves along the friths and lakes that interſect the country; the portentous noiſes which every change of the wind and every increaſed diminution of the waters is apt to raiſe in a lonely region full of echoes and rocks and caverns; the groteſque and ghaſtly appearance of ſuch a landſcape by the light of the moon: objects like theſe diffuſe a gloom over the fancy, which may be compatible enough with occaſional and ſocial merriment, but cannot fail to tincture the thoughts of a native in the hour of ſilence and ſolitude. If theſe people, notwithſtanding their reformation in religion, and more frequent intercourſe with ſtrangers, do ſtill retain many of their old ſuperſtitions, we need not doubt but in former times they muſt have been much more enſlaved to the horrors of imagination, when beſet with the bugbears of Popery and Paganiſm. Moſt of their ſuperſtitions are of a melancholy caſt. That of *ſecond ſight*, by which ſome are ſtill ſuppoſed to be haunted, is conſidered by themſelves as a misfortune, on account of the many dreadful images it is ſaid to obtrude upon the fancy. It is ſaid that ſome of the Alpine regions do likewiſe lay claim to a ſort of ſecond ſight.

Nor

Second. Nor is it wonderful, that perſons of a lively imagination, immured in deep ſolitude, and ſurrounded with the ſtupendous ſcenery of clouds, precipices, and torrents, ſhould dream (even when they think themſelves awake) of thoſe few ſtriking ideas with which their lonely lives are diverſified: of corpſes, funeral proceſſions, and other ſubjects of terror; or of marriages, and the arrival of ſtrangers, and ſuch like matters of more agreeable curioſity.

Let it be obſerved alſo, that the ancient Highlanders of Scotland had hardly any other way of ſupporting themſelves than by hunting, fiſhing, or war; profeſſions that are continually expoſed to fatal accidents. And hence, no doubt, additional horrors would often haunt their ſolitude, and a deeper gloom overſhadow the imagination even of the hardieſt native.

A ſufficient evidence can hardly be found for the reality of the *ſecond ſight*, or at leaſt of what is commonly underſtood by that term. A treatiſe on the ſubject was publiſhed in the year 1762, in which many tales were told of perſons whom the author believed to have been favoured, or haunted, with theſe illuminations; but moſt of the tales were trifling and ridiculous: and the whole work betrayed, on the part of the compiler, ſuch extreme credulity, as could not fail to prejudice many readers againſt his ſyſtem.

That any of theſe viſionaries are apt to be ſwayed in their declarations by ſiniſter views, we will not ſay: but this may be ſaid with confidence, that none but ignorant people pretend to be gifted in this way. And in them it may be nothing more, perhaps, than ſhort fits of ſudden ſleep or drowſineſs, attended with lively dreams, and ariſing from ſome bodily diſorder, the effect of idleneſs, low ſpirits, or a gloomy imagination. For it is admitted, even by the moſt credulous Highlanders, that as knowledge and induſtry are propagated in their country, the ſecond ſight diſappears in proportion; and nobody ever laid claim to the faculty who was much employed in the intercourſe of ſocial life (A). Nor is it at all extraordinary, that one ſhould have the appearance of being awake, and ſhould even think one's ſelf ſo, during thoſe fits of doſing; that they ſhould come on ſuddenly, and while one is engaged in ſome buſineſs. The ſame thing happens to perſons much fatigued, or long kept awake, who frequently fall aſleep for a moment, or for a long ſpace, while they are ſtanding, or walking, or riding on horſeback. Add but a lively dream to this ſlumber, and (which is the frequent effect of diſeaſe) take away the conſciouſneſs of having been aſleep, and a ſuperſtitious man may eaſily miſtake his dream for a waking viſion; which, however, is ſoon forgotten when no ſubſequent occurrence recals it to his memory; but which, if it ſhall be thought to reſemble any future event, exalts the poor dreamer into a Highland prophet. This conceit makes him more recluſe and more melancholy than ever; and ſo feeds his diſeaſe, and multiplies his viſions: which, if they are not diſſipated by buſineſs or ſociety, may continue to haunt him as long as he lives; and which, in their progreſs through the neighbourhood, receive ſome new tinctures of the marvellous from every mouth that promotes their circulation. As to the prophetical nature of this ſecond ſight, it cannot be admitted at all. That the Deity ſhould work a miracle in order to give intimation of the frivolous things that theſe tales are made up of, the arrival of a ſtranger, the nailing of a coffin, or the colour of a ſuit of clothes; and that theſe intimations ſhould be given for no end, and to thoſe perſons only who are idle and ſolitary, who ſpeak Gaelic, or who live among mountains and deſerts—is like nothing in nature or providence that we are acquainted with; and muſt therefore, unleſs it were confirmed by ſatisfactory proof (which is not the caſe), be rejected as abſurd and incredible. Second.

Theſe viſions, ſuch as they are, may reaſonably enough be aſcribed to a diſtempered fancy. And that in them, as well as in our ordinary dreams, certain appearances ſhould, on ſome rare occaſions, reſemble certain events, is to be expected from the laws of chance; and ſeems to have in it nothing more marvellous or ſupernatural, than that the parrot, who deals out his ſcurrilities at random, ſhould ſometimes happen to ſalute the paſſenger by his right appellation.

To the confidence of theſe objections Dr Johnſon replies, that by preſuming to determine what is fit, and what is beneficial, they preſuppoſe more knowledge of the univerſal ſyſtem than man has attained; and therefore depend upon principles too complicated and extenſive for our comprehenſion; and that there can be no ſecurity in the conſequence when the premiſes are not underſtood; that the ſecond ſight is only wonderful becauſe it is rare, for, conſidered in itſelf, it involves no more difficulty than dreams, or perhaps than the regular exerciſe of the cogitative faculty; that a general opinion of communicative impulſes, or viſionary repreſentations, has prevailed in all ages and all nations; that particular inſtances have been given with ſuch evidence, as neither Bacon nor Bayle has been able to reſiſt; that ſudden impreſſions, which the event has verified, have been felt by more than own or publiſh them; that the ſecond ſight of the Hebrides implies only the local frequency of a power, which is nowhere totally unknown; and that where we are unable to decide by antecedent reaſon, we muſt be content to yield to the force of teſtimony. By pretenſion to ſecond ſight, no profit was ever ſought or gained. It is an involuntary affection, in which neither hope nor fear are known to have any part. Thoſe who profeſs to feel it do not boaſt of it as a privilege, nor are conſidered by others as advantageouſly diſtinguiſhed. They have no temptation to feign, and their hearers have no motive to encourage the impoſture.

SECOND Terms, in *Algebra*, thoſe where the unknown quantity has a degree of power leſs than it has in the term where it is raiſed to the higheſt. The art of throwing theſe ſecond terms out of an equation, that is,

(A) This, however, is denied by Johnſon, who affirms that the Iſlanders of all degrees, whether of rank or underſtanding, univerſally admit it except the miniſters, who, according to him, reject it, in conſequence of a ſyſtem, againſt conviction. He affirms, too, that in 1773, there was in the Hebrides a ſecond-ſighted gentleman, who complained of the terrors to which he was expoſed.

Secondary is, of forming a new equation where they have no place, is one of the moſt ingenious and uſeful inventions in all algebra.

Secondary || Secretary.

SECONDARY, in general, ſomething that acts as ſecond or in ſubordination to another.

SECONDARY or *Secundary*, an officer who acts as ſecond or next to the chief officer. Such are the ſecondaries of the courts of king's bench and common pleas; the ſecondaries of the compters, who are next the ſheriffs of London in each of the two compters; two ſecondaries of the pipe; ſecondaries to the remembrancers, &c.

SECONDARY Circles of the Ecliptic are circles of longitude of the ſtars; or circles which, paſſing through the poles of the ecliptic, are at right angles to the ecliptic. See *CIRCLES of Latitude*.

SECONDARY Qualities of Bodies. See METAPHYSICS, N° 153.

SECONDAT. See MONTESQUIEU.

SECRETARIES BIRD, the falco ſerpentarius and ſagittarius of Linnæus, but claſſed by Latham under the genus VULTUR. See ORNITHOLOGY *Index*.

SECRETARY, an officer who, by his maſter's orders, writes letters, diſpatches, and other inſtruments, which he renders authentic by his ſignet. Of theſe there are ſeveral kinds; as, 1. Secretaries of ſtate, who are officers that have under their management and direction the moſt important affairs of the kingdom, and are obliged conſtantly to attend on the king: they receive and diſpatch whatever comes to their hands, either from the crown, the church, the army, private grants, pardons, diſpenſations, &c. as likewiſe petitions to the ſovereign, which, when read, are returned to them; all which they diſpatch according to the king's direction. They have authority to commit perſons for treaſon, and other offences againſt the ſtate, as conſervators of the peace at common law, or as juſtices of the peace throughout the kingdom. They are members of the privy-council, which is ſeldom or never held without one of them being preſent. As to the buſineſs and correſpondence in all parts of this kingdom, it is managed by either of the ſecretaries without any diſtinction; but with reſpect to foreign affairs, the buſineſs is divided into two provinces or departments, the ſouthern and the northern, comprehending all the kingdoms and ſtates that have any intercourſe with Great Britain; each ſecretary receiving all letters and addreſſes from, and making all diſpatches to, the ſeveral princes and ſtates comprehended in his province. Ireland and the Plantations are under the direction of the elder ſecretary, who has the ſouthern province, which alſo comprehends, France, Italy, Switzerland, Spain, Portugal, and Turkey; the northern province includes the Low Countries, Germany, Denmark, Sweden, Poland, and Muſcovy. Each of the ſecretaries has an apartment in all the royal houſes, both for their own accommodation and their officers; they have alſo a table at the king's charge, or elſe board-wages. The two ſecretaries for Britain have each two under ſecretaries, and one chief clerk; with an uncertain number of other clerks and tranſlators, all wholly depending on them. To the ſecretaries of ſtate belong the cuſtody of that ſeal properly called the *ſignet*, and the direction of two other offices, one called the *paper-office*, and the other the *ſignet-office*. In addition to theſe, there is a ſecretary for the war department, whoſe office muſt be temporary. 2. Secretary of an embaſſy, a perſon attending an ambaſſador, for writing diſpatches relating to the negociation. There is a great difference between the ſecretaries of an embaſſy and the ambaſſador's ſecretary; the laſt being a domeſtic or menial of the ambaſſador, and the firſt a ſervant or miniſter of the prince. 3. The ſecretary of war, an officer of the war-office, who has two chief clerks under him, the laſt of which is the ſecretary's meſſenger. There are alſo ſecretaries in moſt of the other offices.

Secretary || Sector.

SECRETION, in the animal economy. See PHYSIOLOGY *Index*.

SECT, a collective term, comprehending all ſuch as follow the doctrines and opinions of ſome famous divine, philoſopher, &c.

SECTION, in general, denotes a part of a divided thing, or the diviſion itſelf. Such, particularly, are the ſubdiviſions of a chapter; called alſo *paragraphs* and *articles*: the mark of a ſection is §.

SECTION, in *Geometry*, denotes a ſide or ſurface of a body or figure cut off by another; or the place where lines, planes, &c. cut each other.

SECTOR, in *Geometry*, is a part of a circle comprehended between two radii and the arch: or it is a mixed triangle, formed by two radii and the arch of a circle.

1 Sector

SECTOR, is alſo a mathematical inſtrument, of great uſe in finding the proportion between quantities of the ſame kind: as between lines and lines, ſurfaces and ſurfaces, &c. whence the French call it the *compaſs of proportion*. The great advantage of the ſector above the common ſcales, &c. is, that it is made ſo as to fit all radii and all ſcales. By the lines of chords, ſines, &c. on the ſector, we have lines of chords, ſines, &c. to any radius betwixt the length and breadth of the ſector when open.

The real inventor of this valuable inſtrument is unknown; yet of ſo much merit has the invention appeared, that it was claimed by Galileo, and diſputed by nations.

The ſector is founded on the fourth propoſition of the ſixth book of Euclid; where it is demonſtrated, that ſimilar triangles have their homologous ſides proportional. An idea of the theory of its conſtruction may be conceived thus. Let the lines AB, AC (Plate CCCCLXXVIII. fig. 1.) repreſent the legs of the ſector; and AD, AE, two equal ſections from the centre: if, now the points CB and DE be connected, the lines CB and DE will be parallel; therefore the triangles ADE, ACB will be ſimilar; and conſequently the ſides AD, DE, AB, and BC, proportional; that is, as AD : DE : : AB : BC: whence, if AD be the half, third, or fourth part of AB; DE will be a half, third, or fourth part of CB: and the ſame holds of all the reſt. If, therefore, AD be the chord, ſine, or tangent, of any number of degrees to the radius AB; DE will be the ſame to the radius BC.

Plate cccclxxviii. Fig. 1.

2 Deſcribed.

Deſcription of the Sector. The inſtrument conſiſts of two rules or legs, of braſs or ivory, or any other matter, repreſenting the radii, moveable round an axis or joint, the middle of which expreſſes the centre; whence are drawn on the faces of the rulers ſeveral ſcales, which may be diſtinguiſhed into ſingle and double.

The double ſcales, or lines graduated upon the faces of Fig. 3. & 4.

Sector.

of the inſtrument, and which are to be uſed as ſectoral lines, proceed from the centre; and are, 1. Two ſcales of equal parts, one on each leg, marked LIN. or L.; each of theſe ſcales, from the great extenſiveneſs of its uſe, is called the *line of lines*. 2. Two lines of chords marked CHO. or C. 3. Two lines of ſecants marked SEC. or S. A line of polygons marked POL. Upon the other face the ſectoral lines are, 1. Two lines of ſines marked SIN. or S. 2. Two lines of tangents marked TAN. or T. 3. Between the line of tangents and ſines there is another line of tangents to a leſſer radius, to ſupply the defect of the former, and extending from 45° to 75°, marked *t*.

Each pair of theſe lines (except the line of polygons) is ſo adjuſted as to make equal angles at the centre; and conſequently at whatever diſtance the ſector be opened, the angles will be always reſpectively equal. That is, the diſtance between 10 and 10 on the line of lines, will be equal to 60 and 60 on the line of chords, 90 and 90 on the line of ſines, and 45 and 45 on the line of tangents.

Beſides the ſectoral ſcales, there are others on each face, placed parallel to the outward edges, and uſed as thoſe of the common plane ſcale. 1. Theſe are a line of inches. 2. A line of latitudes. 3. A line of hours. 4. A line of inclination of meridians. 5. A line of chords. Three logarithmic ſcales, namely, one of numbers, one of ſines, and one of tangents. Theſe are uſed when the ſector is fully opened, the legs forming one line (A).

3 To read and eſtimate the diviſions on the ſector and lines.

The value of the diviſions on moſt of the lines are determined by the figures adjacent to them; theſe proceed by tens, which conſtitute the diviſions of the firſt order, and are numbered accordingly; but the value of the diviſions on the line of lines, that are diſtinguiſhed by figures, is entirely arbitrary, and may repreſent any value that is given to them; hence the figures, 1, 2, 3, 4, &c. may denote either 10, 20, 30, 40, or 100, 200, 300, 400, and ſo on.

The line of lines is divided into ten equal parts, numbered 1, 2, 3, to 10; theſe may be called *diviſions of the firſt order;* each of theſe is again ſubdivided into 10 other equal parts, which may be called *diviſions of the ſecond order;* each of theſe is divided into two equal parts, forming *diviſions of the third order*. The diviſions on all the ſcales are contained between four parallel lines; thoſe of the third order extend to the moſt diſtant; thoſe of the third to the leaſt; thoſe of the ſecond to the intermediate parallel.

When the whole line of lines repreſents 100, the diviſions of the firſt order, or thoſe to which the figures are annexed, repreſent tens; thoſe of the ſecond order units; thoſe of the third order the halves of theſe units. If the whole line repreſent ten, then the diviſions of the firſt order are units; thoſe of the ſecond tenths; the thirds twentieths.

In the line of tangents, the diviſions to which the numbers are affixed, are the degrees expreſſed by thoſe numbers. Every fifth degree is denoted by a line ſomewhat longer than the reſt; between every number and each fifth degree, there are four diviſions longer than the intermediate adjacent ones, theſe are whole degrees; the ſhorter ones, or thoſe of the third order, are 30 minutes.

Sector.

From the centre, to 60 degrees, the line of ſines is divided like the line of tangents, from 60 to 70; it is divided only to every degree, from 70 to 80, to every two degrees, from 80 to 90; the diviſion muſt be eſtimated by the eye.

The diviſions on the line of chords are to be eſtimated in the ſame manner as the tangents.

The leſſer line of tangents is graduated every two degrees, from 45 to 50; but from 50 to 60 to every degree; from 60 to the end, to half degrees.

The line of ſecants from 0 to 10 is to be eſtimated by the eye; from 20 to 50, it is divided to every two degrees; from 50 to 60, to every degree; from 60 to the end, to every half degree.

Uſe of the Line of Equal Parts on the SECTOR. 1. To divide a given line into any number of equal parts, ſuppoſe ſeven. Take the given line in your compaſſes; and ſetting one foot in a diviſion of equal parts, that may be divided by ſeven, for example 70, whoſe ſeventh part is 10, open the ſector till the other point fall exactly on 70, in the ſame line on the other leg. In this diſpoſition, applying one point of the compaſſes to 10 in the ſame line; ſhut them till the other fall in 10 in the ſame line on the other leg, and this opening will be the ſeventh part of the given line. Note, if the line to be divided be too long to be applied to the legs of the ſector, divide only one half or one fourth by ſeven, and the double or quadruple thereof will be the ſeventh part of the whole.

4 Diviſion of a given line by the line of equal parts.

2. To meaſure the lines of the perimeter of a polygon, one of which contains a given number of equal parts. Take the given line in your compaſſes, and ſet it parallel, upon the line of equal parts, to the number on each leg expreſſing its length. The ſector remaining thus, ſet off the length of each of the other lines parallel to the former, and the number each of them falls on will expreſs its length.

5 To meaſure the perimeter of a polygon.

3. A right line being given, and the number of parts it contains, ſuppoſe 120, to take from it a ſhorter line, containing any number of the ſame parts, ſuppoſe 25. Take the given line in your compaſſes, open the ſector till the two feet fall on 120 on each leg; then will the diſtance between 25 on one leg, and the ſame number on the other, give the line required.

6 Subtraction.

4. To multiply by the line of equal parts on the ſector. Take the lateral diſtance from the centre of the line to the given multiplicator; open the ſector till you fit that lateral diſtance to the parallel of 1 and 1, or 10 and 10, and keep the ſector in that diſpoſition; then take in the compaſſes the parallel diſtance of the multiplicand, which diſtance, meaſured laterally on the ſame line, will give the product required. Thus, ſuppoſe it were required to find the product of 8 multiplied by 4: take the lateral diſtance from the centre of the line to 4 in your compaſſes, i. e. place one foot of the compaſſes in the beginning of the diviſions, and extend the other along the line to 4. Open the ſector till you fit this lateral diſtance to the parallel of 1 and 1, or

7 Multiplication.

(A) The lines are placed in different orders on different ſectors, but they may eaſily be found by theſe general directions.

Sector. 1, or 10 and 10. Then take the parallel diſtance of 8, the multiplicand; i. e. extend the compaſſes from 8, in this line, on one leg, to 8 in the ſame line on the other; and that extent, meaſured laterally, will give the product required.

8 Diviſion in general. 5. To divide by the line of equal parts on the ſector. Extend the compaſſes laterally from the beginning of the line to 1, and open the ſector till you fit that extent to the parallel of the diviſor; then take the parallel diſtance of the dividend, which extent, meaſured in a lateral direction, will give the quotient required. Thus, ſuppoſe it was required to divide 36 by 4: extend the compaſſes laterally, the beginning of the line to 1, and fit to that extent the parallel of 4, the diviſor; then extend the compaſſes parallel, from 36 on one leg to 36 on the other, and that extent, meaſured laterally, will give 9, the quotient required.

9 Proportion. 6. Proportion by the line of equal parts. Make the lateral diſtance of the ſecond term the parallel diſtance of the firſt term, the parallel diſtance of the third term is the fourth proportional. *Example.* To find a fourth proportional to 8, 4, and 6, take the lateral diſtance of 4, and make it the parallel diſtance of 8; then the parallel diſtance of 6, extended from the centre, ſhall reach to the fourth proportional 3.

In the ſame manner, a third proportional is found to two numbers. Thus, to find a third proportional to 8 and 4, the ſector remaining as in the former example, the parallel diſtance of 4, extended from the centre, ſhall reach to the third proportional 2. In all theſe caſes, if the number to be made a parallel diſtance be too great for the ſector, ſome aliquot part of it is to be taken, and the anſwer is to be multiplied by the number by which the firſt number was divided.

10 Line of chords. *Uſe of the Line of Chords on the* SECTOR. 1. To open the ſector ſo as the two lines of chords may make an angle or number of degrees, ſuppoſe 40. Take the diſtance from the joint to 40, the number of the degrees propoſed, on the line of chords; open the ſector till the diſtance from 60 to 60, on each leg, be equal to the given diſtance of 40; then will the two lines on the ſector form an angle of 40 degrees, as was required.

2. The ſector being opened, to find the degrees of its aperture. Take the extent from 60 to 60, and lay it off on the line of chords from the centre; the number whereon it terminates will ſhow the degrees, &c. required.

3. To lay off any number of degrees upon the circumference of a circle. Open the ſector till the diſtance between 60 and 60 be equal to the radius of the given circle; then take the parallel extent of the chord of the number of degrees on each leg of the ſector, and lay it off on the circumference of the given circle.—Hence any regular polygon may be eaſily inſcribed in a given circle.

11 Line of polygons. *Uſe of the Line of Polygons on the* SECTOR. 1. To inſcribe a regular polygon in a given circle. Take the ſemidiameter of the given circle in the compaſſes, and adjuſt it to the number 6, on the line of polygons, on each leg of the ſector: then, the ſector remaining thus opened, take the diſtance of the two equal numbers, expreſſing the number of ſides the polygon is to have; *e. gr.* the diſtance from 5 to 5 for a pentagon, from 7 to 7 for a heptagon, &c. Theſe diſtances carried about the circumference of the circle, will divide it into ſo many equal parts. Sector.

2. To deſcribe a regular polygon, *e. gr.* a pentagon, on a given right line. Take the length of the line in the compaſſes, and apply it to the extent of the number 5, 5, on the lines of polygons. The ſector thus opened, upon the ſame lines take the extent from 6 to 6; this will be the ſemidiameter of the circle the polygon is to be inſcribed in. If then, with this diſtance, from the ends of the given line, you deſcribe two arches of a circle, their interſection will be the centre of the circle.

3. On a right line, to deſcribe an iſoceles triangle, having the angles at the baſe double that at the vertex. Open the ſector, till the ends of the given line fall on 10 and 10 on each leg; then take the diſtance from 6 to 6. This will be the length of the two equal ſides of the triangle.

12 Sines, tangents, and ſecants. *Uſe of the Lines of Sines, Tangents, and Secants, on the* SECTOR. By the ſeveral lines diſpoſed on the ſector, we have ſcales to ſeveral radii; ſo that having a length or radius given, not exceeding the length of the ſector when opened, we find the chord, ſine, &c. thereto: *e. gr.* Suppoſe the chord, ſine, or tangent of 10 degrees, to a radius of 3 inches required; make 3 inches the aperture between 60 and 60, on the lines of chords of the two legs; then will the ſame extent reach from 45 to 45 on the line of tangents, and from 90 to 90 on the line of the ſines on the other ſide; ſo that to whatever radius the line of chords is ſet, to the ſame are all the others ſet. In this diſpoſition, therefore, if the aperture between 10 and 10, on the lines of chords, be taken with the compaſſes, it will give the chord of 10 degrees. If the aperture of 10 and 10 be in like manner taken on the lines of ſines, it will be the ſine of 10 degrees. Laſtly, if the aperture of 10 and 10 be in like manner taken on the lines of tangents, it gives the tangent of 10 degrees.

If the chord, or tangent, of 70 degrees were required; for the chord, the aperture of half the arch, viz. 35, muſt be taken, as before; which diſtance, repeated twice, gives the chord of 70 degrees. To find the tangent of 70 degrees to the ſame radius, the ſmall line of tangents muſt be uſed, the other only reaching to 45: making, therefore, 3 inches the aperture between 45 and 45 on the ſmall line; the extent between 70 and 70 degrees on the ſame, will be the tangent of 70 degrees to 3 inches radius.

To find the ſecant of an arch, make the given radius the aperture between 0 and 0 on the lines of ſecants: then will the aperture of 10 and 10, or 70 and 70, on the ſaid lines, give the tangent of 10^0 or 70^0.

If the converſe of any of theſe things were required, that is, if the radius be required, to which a given line is the ſine, tangent, or ſecant, it is but making the given line, if a chord, the aperture on the line of chords between 10 and 10, and then the ſector will ſtand at the radius required; that is, the aperture between 60 and 60 on the ſaid line is the radius. If the given line were a ſine, tangent, or ſecant, it is but making it the aperture of the given number of degrees; then will the diſtance of 90 and 90 on the ſines, of 45 and 45 on the tangents, of 0 and 0 on the ſecants, be the radius.

SECTOR of an Ellipſe, of an Hyperbola, &c. is a part reſembling

Sector, Secular.

reſembling the circular ſector, being contained by three lines, two of which are radii, or lines drawn from the centre of the figure to the curve, and the intercepted arc or part of that curve.

SECTOR of a Sphere, is the ſolid generated by the revolution of the ſector of a circle about one of its radii; the other radius deſcribing the ſurface of a cone, and the circular arc a circular portion of the ſurface of the ſphere of the ſame radius. So that the ſpherical ſector conſiſts of a right cone, and of a ſegment of the ſphere having the ſame common baſe with the cone. Hence the ſolid content of it will be found by multiplying the baſe or ſpherical ſurface by the radius of the ſphere, and taking one third of the product.

Aſtronomical SECTOR. See *ASTRONOMICAL Sector*.

Dialing SECTOR. See DIALING.

SECULAR, that which relates to affairs of the preſent world, in which ſenſe the word ſtands oppoſed to *ſpiritual*, *eccleſiaſtical*: thus we ſay ſecular power, &c.

SECULAR, is more peculiarly uſed for a perſon who lives at liberty in the world, not ſhut up in a monaſtery, nor bound by vows, or ſubjected to the particular rules of any religious community; in which ſenſe it ſtands oppoſed to *regular*. The Romiſh clergy are divided into ſecular and regular, of which the latter are bound by monaſtic rules, the former not.

SECULAR Games, in antiquity, ſolemn games held among the Romans once in an age. Theſe games laſted three days and as many nights; during which time ſacrifices were performed, theatrical ſhews exhibited, with combats, ſports, &c. in the circus. The occaſion of theſe games, according to Valerius Maximus, was to ſtop the progreſs of a plague. Valerius Publicola was the firſt who celebrated them at Rome in the year of the city 245. The ſolemnity was as follows: The whole world was invited by a herald to a feaſt which they had never ſeen already, nor ever ſhould ſee again. Some days before the games began, the quindecemviri in the Capitol and the Palatine temple, diſtributed to the people purifying compoſitions, of various kinds, as flambeaus, ſulphur, &c. From hence the populace paſſed to Diana's temple on the Aventine mount, with wheat, barley, and oats, as an offering. After this, whole nights were ſpent in devotion to the Deſtinies. When the time of the games was fully come, the people aſſembled in the Campus Martius, and ſacrificed to Jupiter, Juno, Apollo, Latona, Diana, the Parcæ, Ceres, Pluto, and Proſerpine. On the firſt night of the feaſt the emperor, with the quindecemviri, cauſed three altars to be erected on the banks of the Tiber, which they ſprinkled with the blood of three lambs, and then proceeded to regular ſacrifice. A ſpace was next marked out for a theatre, which was illuminated with innumerable flambeaus and fires. Here they ſung hymns, and celebrated all kinds of ſports. On the day after, having offered victims at the Capitol, they went to the Campus Martius, and celebrated ſports to the honour of Apollo and Diana. Theſe laſted till next day, when the noble matrons, at the hour appointed by the oracle, went to the Capitol to ſing hymns to Jupiter. On the third day, which concluded the ſolemnity, twenty ſeven boys, and as many girls, ſung in the temple of Palatine Apollo hymns and verſes in Greek and Latin, to recommend the city to the protection of thoſe deities whom they deſigned particularly to honour by their ſacrifices.

The inimitable Carmen Seculare of Horace was compoſed for this laſt day, in the Secular Games, held by Auguſtus. Secular ‖ Secundus.

It has been much diſputed whether theſe games were held every hundred, or every hundred and ten years. Valerius Antius, Varro, and Livy, are quoted in ſupport of the former opinion: In favour of the latter may be produced the quindecemviral regiſters, the edicts of Auguſtus, and the words of Horace in the Secular poem,

Cœtus undenos decies per annos.

It was a general belief, that the girls who bore a part in the ſong ſhould be ſooneſt married; and that the children who did not dance and ſing at the coming of Apollo, ſhould die unmarried, and at an early period of life.

SECULAR Poem, a poem ſung or rehearſed at the ſecular games; of which kind we have a very fine piece among the works of Horace, being a ſapphic ode at the end of his epodes.

SECULARIZATION, the act of converting a regular perſon, place, or benefice, into a ſecular one. Almoſt all the cathedral churches were anciently regular, that is, the canons were to be religious; but they have been ſince ſecularized. For the ſecularization of a regular church, there is required the authority of the pope, that of the prince, the biſhop of the place, the patron, and even the conſent of the people. Religious that want to be releaſed from their vow, obtain briefs of ſecularization from the pope.

SECUNDINES, in *Anatomy*, the ſeveral coats or membranes wherein the fœtus is wrapped up in the mother's womb; as the chorion and amnios, with the placenta, &c.

SECUNDUS, JOANNES NICOLAIUS, an elegant writer of Latin poetry, was born at the Hague in the year 1511. His deſcent was from an ancient and honourable family in the Netherlands; and his father Nicolaus Everardus, who was born in the neighbourhood of Middleburg, ſeems to have been high in the favour of the emperor Charles V. as he was employed by that monarch in ſeveral ſtations of conſiderable importance. We find him firſt a member of the grand parliament or council of Mechelen, afterwards preſident of the ſtates of Holland and Zealand at the Hague, and laſtly holding a ſimilar office at Mechelen, where he died, Auguſt 5. 1532, aged 70.

Theſe various employments did not occupy the whole of Everardus's time. Notwithſtanding the multiplicity of his buſineſs, he found leiſure to cultivate letters with great ſucceſs, and even to act as preceptor to his own children, who were five ſons and three daughters. They all took the name of Nicolaii from their father; but on what account our author was called *Secundus* is not known. It could not be from the order of his birth, for he was the youngeſt ſon. Perhaps the name was not given him till he became eminent; and then, according to the faſhion of the age, it might have its riſe from ſome pun, ſuch as his being *Poetarum nemini Secundus*. Poetry, however, was by no means the profeſſion which his father wiſhed him to follow. He intended him for the law, and when he could no longer direct his ſtudies himſelf, placed him under the care of

Secundus. *Jacobus Valeardus*. This man is said to have been every way well qualified to discharge the important trust which was committed to him; and he certainly gained the affection of his pupil, who, in one of his poems, mentions the death of Valeardus with every apppearance of unfeigned sorrow. Another tutor was soon provided; but it does not appear that Secundus devoted much of his time to legal pursuits. Poetry and the sister arts of painting and sculpture had engaged his mind at a very early period; and the imagination, on which these have laid hold, can with difficulty submit to the dry study of musty civilians. Secundus is said to have written verses when but ten years old; and from the vast quantity which he left behind him, we have reason to conclude that such writing was his principal employment. He found time, however, to carve figures of all his own family, of his mistresses, of the emperor Charles V. of several eminent personages of those times, and of many of his intimate friends; and in the last edition of his works published by Scriverius at Leyden, 1631, there is a print of one of his mistresses with this inscription round it; VATIS AMATORIS JULIA SCULPTA MANU.

Secundus having nearly attained the age of twenty-one, and being determined, as it would seem, to comply as far as possible with the wishes of his father, quitted Mechelen, and went to France, where at *Bourges*, a city in the *Orleanois*, he studied the civil law under the celebrated *Andreas Alciatus*. Alciatus was one of the most learned civilians of that age; but what undoubtedly endeared him much more to our author was his general acquaintance with polite literature, and more particularly his taste in poetry. Having studied a year under this eminent professor, and taken his degrees, Secundus returned to Mechelen, where he remained only a very few months. In 1533 he went into Spain with warm recommendations to the count of Nassau and other persons of high rank; and soon afterwards became secretary to the cardinal archbishop of Toledo in a department of business which required no other qualifications than what he possessed in a very eminent degree, a facility in writing with elegance the Latin language. It was during his residence with this cardinal that he wrote his *Basia*, a series of wanton poems, of which the fifth, seventh, and ninth *carmina* of *Catullus* seem to have given the hint. Secundus was not, however, a servile imitator of Catullus. His expressions seem to be borrowed rather from *Tibullus* and *Propertius*; and in the warmth of his descriptions he surpasses every thing that has been written on similar subjects by *Catullus*, *Tibullus*, *Propertius*, *C. Gallus*, *Ovid*, or *Horace*.

In 1535 he accompanied the emperor Charles V. to the siege of Tunis, but gained no laurels as a soldier. The hardships which were endured at that memorable siege were but little suited to the soft disposition of a votary of Venus and the muses; and upon an enterprise which might have furnished ample matter for an epic poem, it is remarkable that Secundus wrote nothing which has been deemed worthy of preservation. Having returned from his martial expedition, he was sent by the cardinal to Rome to congratulate the pope upon the success of the emperor's arms; but was taken so ill on the road, that he was not able to complete his journey. He was advised to seek, without a moment's delay, the benefit of his native air; and that happily recovered him. Secundus || Secutores.

Having now quitted the service of the archbishop of Toledo, Secundus was employed in the same office of secretary by the bishop of Utrecht; and so much had he hitherto distinguished himself by the classical elegance of his compositions, that he was soon called upon to fill the important post of private Latin secretary to the emperor, who was then in Italy. This was the most honourable office to which our author was ever appointed; but before he could enter upon it death put a stop to his career of glory. Having arrived at *Saint Amand* in the district of *Tournay*, in order to meet, upon business, with the bishop of Utrecht, he was on the 8th of October 1536 cut off by a violent fever, in the very flower of his age, not having quite completed his twenty-fifth year. He was interred in the church of the Benedictines, of which his patron, the bishop, was *abbot* or *pro-abbot*; and his near relations erected to his memory a marble monument, with a plain Latin inscription.

The works of Secundus have gone through several editions, of which the best and most copious is that of Scriverius already mentioned. It consists of JULIA, *Eleg.* lib. i.; AMORES, *Eleg.* lib. ii.; AD DIVERSOS *Eleg.* lib. iii.; BASIA, styled by the editor *incomparabilis et divinus prorsus liber*; EPIGRAMMATA; ODARUM *liber unus*; EPISTOLARUM *liber unus Elegiaca*; EPISTOLARUM *liber alter, heroico carmine scriptus*; FUNERUM *liber unus*; SYLVÆ *et* CARMINUM *fragmenta*; POEMATA *nonnulla fratrum*; ITINERARIA *Secundi tria*, &c.; EPISTOLÆ *totidem, soluta oratione*. Of these works it would be superfluous in us to give any character after the ample testimonies prefixed to them of *Lelius Greg. Gyraldus*, the elder *Scaliger*, *Theodore Beza*, and others equally celebrated in the republic of letters, who all speak of them with rapture. A French critic, indeed, after having affirmed that the genius of Secundus never produced any thing which was not excellent in its kind, adds, with too much truth, *Mais sa muse est un peu trop lascive*. For this fault our author makes the following apology in an epigram addressed to the grammarians;

Carmina cur spargam cunctis lasciva libellis,
Queritis? Insulsos arceo grammaticos.
Fortia magnanimi canerem si Cæsaris arma,
Factave DIVORUM religiosa VIRUM:
Quot miser exciperemque notas, patererque lituras?
Quot fierem teneris supplicium pueris?
At nunc uda mihi dictant cum BASIA carmen,
Pruriet et versu mentula multa meo:
Me leget innuptæ juvenis placiturus amicæ,
Et placitura nova blanda puella viro:
Et quemcunque juvat lepidorum de grege vatum
Otia festivis ludere deliciis.
Lusibus et lætis procul hinc absistite, SÆVI
GRAMMATICI, injustas et cohibite manus.
Ne puer, ab malleis cæsus lacrymansque leporis;
DURAM FORTE MEIS OSSIBUS OPTET HUMUM.

SECURIDACA, a genus of plants belonging to the class diadelphia. See BOTANY *Index*.

SECUTORES, a species of gladiators among the Romans, whose arms were a helmet, a shield, and a sword or a leaden bullet. They were armed in this manner, because they had to contend with the retiarii, who were

Secutores ‖ Sedition.

were dreſſed in a ſhort tunic, bore a three-pointed lance in their left hand, and a net in their right. The retiarius attempted to caſt his net over the head of the ſecutor; and if he ſucceeded, he drew it together and ſlew him with his trident: but if he miſſed his aim, he immediately betook himſelf to flight till he could find a ſecond opportunity of entangling his adverſary with his net. He was purſued by the ſecutor, who endeavoured to diſpatch him in his flight.

Secutores was alſo a name given to ſuch gladiators as took the place of thoſe killed in the combat, or who engaged the conqueror. This poſt was uſually taken by lot.

SEDAN is a town in France, in the department of the Ardennes, in E. Long. 4. 45. N. Lat. 49. 46. This is the capital of a principality of the ſame name, ſituated on the Maeſe, ſix miles from Bouillon, and fifteen from Charleville. Its ſituation on the frontiers of the territory of Liege, Namur, and Limburg, formerly rendered it one of the keys of the kingdom. It is extremely well fortified, and defended by a ſtrong citadel. The caſtle is ſituated on a rock, ſurrounded with large towers and ſtrong walls; here you ſee a moſt beautiful magazine of ancient arms. The governor's palace is oppoſite the caſtle. From the ramparts you have a moſt agreeable proſpect of the Maeſe and the neighbouring country. Though the town is but ſmall, yet it is full of tradeſmen, as tanners, weavers, dyers, &c. the manufacture of fine cloth in this city employing a great number of hands. The principality of Sedan formerly belonged to the duke of Bouillon, who was obliged in the beginning of the laſt century to reſign it to the crown.

SEDAN-CHAIR is a covered vehicle for carrying a ſingle perſon, ſuſpended by two poles, and borne by two men, hence denominated *chairmen*. They were firſt introduced in London in 1634, when Sir Sanders Duncomb obtained the ſole privilege to uſe, let, and hire a number of the ſaid covered chairs for fourteen years.

SEDGMOOR, a large and rich tract of land in Somerſetſhire, memorable for the defeat of the duke of Monmouth, in 1685. It lies between Somerton and Bridgewater.

SEDITION, among civilians, is uſed for a factious commotion of the people, or an aſſembly of a number of citizens without lawful authority, tending to diſturb the peace and order of the ſociety. This offence is of different kinds: ſome ſeditions more immediately threatening the ſupreme power, and the ſubverſion of the preſent conſtitution of the ſtate; others tending only towards the redreſs of private grievances. Among the Romans, therefore, it was variouſly puniſhed, according as its end and tendency threatened greater miſchief. See lib. i. *Cod. de Seditioſis*, and *Mat. de Crimin.* lib. ii. n. 5. *de Læſa Majeſtate.* In the puniſhment, the authors and ringleaders were juſtly diſtinguiſhed from thoſe who, with leſs wicked intention, joined and made part of the multitude.

The ſame diſtinction holds in the law of England and in that of Scotland. Some kinds of ſedition in England amount to high treaſon, and come within the ſtat. 25 Edw. III. as levying war againſt the king. And ſeveral ſeditions are mentioned in the Scotch acts of parliament as treaſonable. *Bayne's Crim. Law of Scotland*, p. 33, 34. The law of Scotland makes riotous and tumultuous aſſemblies a ſpecies of ſedition. But the law there, as well as in England, is now chiefly regulated by the riot act, made 1 Geo. I. only it is to be obſerved, that the proper officers in Scotland, to make the proclamation thereby enacted, are ſheriffs, ſtewards, and bailies of regalities, or their deputies; magiſtrates of royal boroughs, and all other inferior judges and magiſtrates; high and petty conſtables, or other officers of the peace, in any county, ſtewartry, city, or town. And in that part of the iſland, the puniſhment of the offence is any thing ſhort of death which the judges, in their diſcretion, may appoint.

Sedition ‖ Sedley.

SEDATIVES, in *Medicine*, a general name for ſuch medicines as weaken the powers of nature, ſuch as blood-letting, cooling ſalts, purgatives, &c.

SE-DEFENDENDO, in *Law*, a plea uſed for him that is charged with the death of another, by alleging that he was under a neceſſity of doing what he did in his own defence: as that the other aſſaulted him in ſuch a manner, that if he had not done what he did, he muſt have been in hazard of his own life. See HOMICIDE and MURDER.

SEDIMENT, the ſettlement or dregs of any thing, or that groſs heavy part of a fluid body which ſinks to the bottom of the veſſel when at reſt.

SEDLEY, SIR CHARLES, an Engliſh poet and wit, the ſon of Sir John Sedley of Aylesford in Kent, was born about the year 1639. At the reſtoration he came to London to join the general jubilee; and commenced wit, courtier, poet, and gallant. He was ſo much admired, that he became a kind of oracle among the poets; which made King Charles tell him, that Nature had given him a patent to be Apollo's viceroy. The productions of his pen were ſome plays, and ſeveral delicately tender amorous poems, in which the ſoftneſs of the verſes was ſo exquiſite, as to be called by the duke of Buckingham *Sedley's witchcraft.* "There were no marks of genius or true poetry to be deſcried, (ſay the authors of the *Biographia Britannica*); the art wholly conſiſted in raiſing looſe thoughts and lewd deſires, without giving any alarm; and ſo the poiſon worked gently and irreſiſtibly. Our author, we may be ſure, did not eſcape the infection of his own art, or rather was firſt tainted himſelf before he ſpread the infection to others."—A very ingenious writer of the preſent day, however, ſpeaks much more favourably of Sir Charles Sedley's writings. "He ſtudied human nature; and was diſtinguiſhed for the art of making himſelf agreeable, particularly to the ladies; for the verſes of Lord Rocheſter, beginning with, *Sedley has that prevailing gentle art*, &c. ſo often quoted, allude not to his *writings*, but to his *perſonal addreſs.*" [*Langhorn's Effuſions*, &c.].—But while he thus grew in reputation for wit and in favour with the king, he grew poor and debauched: his eſtate was impaired, and his morals were corrupted. One of his frolics, however, being followed by an indictment and a heavy fine, Sir Charles took a more ſerious turn, applied himſelf to buſineſs, and became a member of parliament, in which he was a frequent ſpeaker. We find him in the houſe of commons in the reign of James II. whoſe attempts upon the conſtitution he vigorouſly withſtood; and he was very active in bringing on the revolution. This was thought more extraordinary, as he had received favours from James. But that prince had taken a fancy to Sir

Charles's

Sedley || Seduction.

Charles's daughter (though it ſeems ſhe was not very handſome), and, in conſequence of his intrigues with her, he created Miſs Sedley counteſs of Dorcheſter. This honour, ſo far from pleaſing, greatly ſhocked Sir Charles. However libertine he himſelf had been, yet he could not bear the thoughts of his daughter's diſhonour; and with regard to her exaltation, he only conſidered it as rendering her more conſpicuouſly infamous. He therefore conceived a hatred for the king; and from this, as well as other motives, readily joined to diſpoſſeſs him of the throne. A witty ſaying of Sedley's, on this occaſion, is recorded. "I hate ingratitude, (ſaid Sir Charles); and therefore, as the king has made my daughter a counteſs, I will endeavour to make his daughter a queen;" meaning the princeſs Mary, married to the prince of Orange, who diſpoſſeſſed James of the throne at the revolution. He lived to the beginning of Queen Anne's reign; and his works were printed in two vols. 8vo. 1719.

SEDR, or SEDRE, the high-prieſt of the ſect of Ali among the Perſians. The ſedre is appointed by the emperor of Perſia, who uſually confers the dignity on his neareſt relation. The juriſdiction of the ſedre extends over all effects deſtined for pious purpoſes, over all moſques, hoſpitals, colleges, ſepulchres, and monaſteries. He diſpoſes of all eccleſiaſtical employments, and nominates all the ſuperiors of religious houſes. His deciſions in matters of religion are received as ſo many infallible oracles: he judges of all criminal matters in his own houſe without appeal. His authority is balanced by that of the mudfitehid, or firſt theologue of the empire.

SEDUCTION, is the act of tempting and drawing aſide from the right path, and comprehends every endeavour to corrupt any individual of the human race. This is the import of the word in its largeſt and moſt general ſenſe; but it is commonly employed to expreſs the act of tempting a virtuous woman to part with her chaſtity.

The *ſeducer* of female innocence practiſes the ſame ſtratagems of fraud to get poſſeſſion of a woman's perſon, that the *ſwindler* employs to get poſſeſſion of his neighbour's goods or money; yet the law of honour, which pretends to abhor *deceit*, and which impels its votaries to *murder* every man who preſumes, however juſtly, to ſuſpect them of fraud, or to queſtion their veracity, applauds the addreſs of a ſucceſsful intrigue, though it be well known that the ſeducer could not have obtained his end without ſwearing to the truth of a thouſand falſehoods, and calling upon God to witneſs promiſes which he never meant to fulfil.

The law of honour is indeed a very capricious rule, which accommodates itſelf to the pleaſures and conveniences of higher life; but the law of the land, which is enacted for the equal protection of high and low, may be ſuppoſed to view the guilt of ſeduction with a more impartial eye. Yet for this offence, even the laws of this kingdom have provided no other puniſhment than a pecuniary ſatisfaction to the injured family; which, in England, can be obtained only by one of the quainteſt fictions in the world, by the father's bringing his action againſt the ſeducer for the loſs of his daughter's ſervice during her pregnancy and nurturing. See Paley's *Moral Philoſophy*, Book III. Part iii. Chap. 3.

The moraliſt, however, who eſtimates the merit or demerit of actions, not by laws of human appointment, but by their general conſequences as eſtabliſhed by the laws of nature, muſt conſider the ſeducer as a criminal of the deepeſt guilt. In every civilized country, and in many countries where civilization has made but ſmall progreſs, the virtue of women is collected as it were into a ſingle point, which they are to guard above all things, as that on which their happineſs and reputation wholly depend. At firſt ſight this may appear a capricious regulation; but a moment's reflection will convince us of the contrary. In the married ſtate ſo much confidence is neceſſarily repoſed in the fidelity of women to the beds of their huſbands, and evils ſo great reſult from the violation of that fidelity, that whatever contributes in any degree to its preſervation, muſt be agreeable to him who, in eſtabliſhing the laws of nature, intended them to be ſubſervient to the real happineſs of all his creatures. But nothing contributes ſo much to preſerve the fidelity of wives to their huſbands, as the impreſſing upon the minds of women the higheſt veneration for the virtue of chaſtity. She who, when unmarried, has been accuſtomed to grant favours to different men, will not find it eaſy, if indeed poſſible, to reſiſt afterwards the allurements of variety. It is therefore a wiſe inſtitution, and agreeable to the will of Him who made us, to train up women ſo as that they may look upon the loſs of their chaſtity as the moſt diſgraceful of all crimes; as that which ſinks them in the order of ſociety, and robs them of all their value. In this light virtuous women actually look upon the loſs of chaſtity. The importance of that virtue has been ſo deeply impreſſed upon their minds, and is ſo cloſely aſſociated with the principle of honour, that they cannot think but with abhorrence upon the very deed by which it is loſt. He therefore who by fraud and falſehood perſuades the unſuſpecting girl to deviate in one inſtance from the honour of the ſex, weakens in a great degree her moral principle; and if he reconcile her to a repetition of her crime, he deſtroys that principle entirely, as ſhe has been taught to conſider all other virtues as inferior to that of chaſtity. Hence it is that the hearts of proſtitutes are generally ſteeled againſt the miſeries of their fellow-creatures; that they lend their aid to the ſeducer in his practices upon other girls; that they lie and ſwear and ſteal without compunction; and that too many of them heſitate not to commit murder if it can ſerve any ſelfiſh purpoſe of their own.

Seduction.

The loſs of virtue, though the greateſt that man or woman can ſuſtain, is not the only injury which the ſeducer brings on the girl whom he deceives. She cannot at once reconcile herſelf to proſtitution, or even to the loſs of character; and while a ſenſe of ſhame remains in her mind, the miſery which ſhe ſuffers muſt be exquiſite. She knows that ſhe has forfeited what in the female character is moſt valued by both ſexes; and ſhe muſt be under the perpetual dread of a diſcovery. She cannot even confide in the honour of her ſeducer, who may reveal her ſecret in a fit of drunkenneſs, and thus rob her of her fame as well as of her virtue; and while ſhe is in this ſtate of anxious uncertainty, the agony of her mind muſt be inſupportable. That it is ſo in fact, the many inſtances of child murder by unmarried women of every rank leave us no room to doubt. The affection of a mother to her new-born child is one of the moſt unequivocal and ſtrongeſt inſtincts in human nature

Seduction. nature (see INSTINCT); and nothing short of the extremity of distress could prompt any one so far to oppose her nature as to embrue her hands in the blood of her imploring infant.

Even this deed of horror seldom prevents a detection of the mother's frailty, which is indeed commonly discovered, though no child has been the consequence of her intrigue. He who can seduce is base enough to betray; and no woman can part with her honour, and retain any well-grounded hope that her amour shall be kept secret. The villain to whom she surrendered will glory in his victory, if it was with difficulty obtained; and if she surrendered at discretion, her own behaviour will reveal her secret. Her reputation is then irretrievably lost, and no future circumspection will be of the smallest avail to recover it. She will be shunned by the virtuous part of her own sex, and treated as a mere instrument of pleasure by the other. In such circumstances she cannot expect to be married with advantage. She may perhaps be able to captivate the heart of a heedless youth, and prevail upon him to unite his fate to her's before the delirium of his passion shall give him time for reflection; she may be addressed by a man who is a stranger to her story, and married while he has no suspicion of her secret; or she may be solicited by one of a station inferior to her own, who, though acquainted with every thing that has befallen her, can barter the delicacy of wedded love for some pecuniary advantage; but from none of these marriages can she look for happiness. The delirium which prompted the first will soon vanish, and leave the husband to the bitterness of his own reflections, which can hardly fail to produce cruelty to the wife. Of the secret, to which, in the second case, the lover was a stranger, the husband will soon make a discovery, or at least find room for harbouring strong suspicions; and suspicions of having been deceived in a point so delicate have hitherto been uniformly the parents of misery. In the third case, the man married her merely for money, of which having got the possession, he has no farther inducement to treat her with respect. Such are some of the consequences of seduction, even when the person seduced has the good fortune to get afterwards a husband; but this is a fortune which few in her circumstances can reasonably expect. By far the greater part of those who have been defrauded of their virtue by the arts of the seducer sink deeper and deeper into guilt, till they become at last common prostitutes. The public is then deprived of their service as wives and parents; and instead of contributing to the population of the state, and to the sum of domestic felicity, these outcasts of society become seducers in their turn, corrupting the morals of every young man whose appetites they can inflame, and of every young woman whom they can entice to their own practices.

All this complication of evil is produced at first by arts, which, if employed to deprive a man of his property, would subject the offender to the execration of his fellow-subjects, and to an ignominious death: but while the forger of a bill is pursued with relentless rigour by the ministers of justice, and the swindler loaded with universal reproach, the man who by fraud and forgery has enticed an innocent girl to gratify his desires at the expence of her virtue, and thus introduced her into a path which must infallibly lead to her own ruin, as well as to repeated injuries to the public at large, is not despised by his own sex, and is too often caressed even by the virtuous part of the other. Yet the loss of property may be easily repaired; the loss of honour is irreparable! It is vain to plead in alleviation of this guilt, that women should be on their guard against the arts of the seducer. Most unquestionably they should; but arts have been used which hardly any degree of caution would have been sufficient to counteract. It may as well be said that the trader should be on his guard against the arts of the forger, and accept of no bill without previously consulting him in whose name it is written. Cases, indeed, occur in trade, in which this caution would be impossible; but he must be little acquainted with the workings of the human heart, who does not know that situations likewise occur in life, in which it is equally impossible for a girl of virtue and tenderness to resist the arts of the man who has completely gained her affections. Seduction || Seeds.

The mentioning of this circumstance leads us to consider another species of seduction, which, though not so highly criminal as the former, is yet far removed from innocence; we mean the practice which is too prevalent among young men of fortune of employing every art in their power to gain the hearts of heedless girls whom they resolve neither to marry nor to rob of their honour. Should a man adhere to the latter part of this resolution, which is more than common fortitude can always promise for itself, the injury which he does to the object of his amusement is yet very great, as he raises hopes of the most sanguine kind merely to disappoint them, and diverts her affections perhaps for ever from such men as, had they been fixed on one of them, might have rendered her completely happy. Disappointments of this kind have sometimes been fatal to the unhappy girl; and even when they have neither deprived her of life, nor disordered her reason, they have often kept her wholly from marriage, which, whatever it be to a man, is that from which every woman expects her chief happiness. We cannot therefore conclude this article more properly than with warning our female readers not to give up their hearts hastily to men whose station in life is much higher than their own; and we beg leave to assure every one of them, that the man who solicits the last favour under the most solemn promise of a subsequent marriage, is a base seducer, who prefers a momentary gratification of his own to her honour and happiness through life, and has no intention to fulfil his promise. Or, if he should by any means be compelled to fulfil it, she may depend upon much ill treatment in return for her premature compliance with his base desires.

SEDUM, ORPINE, a genus of plants belonging to the decandria class, and in the natural method ranking under the 13th order, *Succulentæ*. See BOTANY *Index*.

SEED, in *Physiology*, a substance prepared by nature for the reproduction and conservation of the species both in animals and plants. See BOTANY and PHYSIOLOGY.

SEEDLINGS, among gardeners, denote such roots of gilliflowers, &c. as come from seed sown. Also the young tender shoots of any plants that are newly sown.

SEEDS, PRESERVATION OF, in a state fit for vegetation, is a matter of great and general importance, because,

Seeds || Seeks.

cauſe, if it be poſſible to accompliſh it, we ſhall thus be enabled to rear many uſeful plants in one country which are there unknown, being indigenous only in others at a great diſtance from it.

A gentleman informs us, that many years ago he obſerved ſome ſeeds which had got accidentally among raiſins, being ſuch as are raiſed in England with difficulty, after being ſent from abroad in the uſual manner. He ſowed them in pots within a framing; and as every one of them grew, he ſent orders to his ſons, who were at that time abroad, to pack up all kinds of ſeeds they could procure, in abſorbent paper, and ſend ſome of them ſurrounded by raiſins, and others by brown moiſt ſugar; concluding, that the preſervation of the former ſeeds had been owing to a peculiarly favourable ſtate of the moiſture thus afforded them. He likewiſe concluded that, as many of our common ſeeds, ſuch as clover, charlock, &c. would lie dormant for ages within the earth, well preſerved for vegetation whenever they were thrown to its ſurface, and expoſed to the influence of the atmoſphere, ſo likewiſe might theſe foreign ſeeds be equally preſerved, at leaſt for many months, by the kindly covering and genial moiſture afforded them by ſugar or raiſins. This opinion was fully verified, as not one in twenty of them failed to vegetate, while the ſame ſpecies of ſeeds ſent home in common parcels along with them, did not vegetate at all. Having examined them prior to their being committed to the earth, he obſerved that there was a prevailing dryneſs in the latter, while the former looked healthy and freſh, not being in the ſmalleſt degree infeſted by inſects, as was the caſe with the others. It has been repeatedly tried to convey ſeeds cloſed up in bottles, but this method has failed of ſucceſs, a larger proportion of air, as well as a proper ſtate of moiſture, perhaps being neceſſary. It may be requiſite to obſerve, that no difference was made in the package of the ſeeds, reſpecting their being kept in huſks, pods, &c. ſo as to give thoſe preſerved in raiſins or ſugar any advantage over the others, the whole being ſent equally guarded by their natural teguments *.

* *Tranſactions of the Society of Arts*, vol. xvi.

SEEDY, in the brandy trade, a term uſed by the dealers to denote a fault that is found in ſeveral parcels of French brandy, which renders them unſaleable. The French ſuppoſe that theſe brandies obtain the flavour which they expreſs by this name, from weeds that grow among the vines from whence the wine of which this brandy is preſſed was made.

SEEING, the perceiving of external objects by means of the eye. For an account of the organs of ſight, and the nature of viſion, ſee ANATOMY and OPTICS *Index*.

SEEKS, a religious ſect ſettled at Patna, and ſo called from a word contained in one of the commandments of their founder, which ſignifies *learn thou*. In books giving an account of oriental ſects and oriental cuſtoms, we find mention made both of *Seeks* and *Seiks*; and we are ſtrongly inclined to think that the ſame tribe is meant to be denominated by both words. If ſo, different authors write very differently of their principles and manners. We have already related ſomething of the character of the *Seiks* under the article HINDOOS; but in the Aſiatic Reſearches, Mr Wilkins gives a much more amiable account of the *Seeks*, which we lay before our readers with pleaſure.

The Seeks are a ſect diſtinguiſhed both from the Muſſulmans and the worſhippers of Brahma; and, from our author's account of them, muſt be an amiable people. He aſked leave to enter into their chapel: They ſaid it was a place of worſhip, open to all men, but intimated that he muſt take off his ſhoes. On complying with this ceremony, he was politely conducted into the hall, and ſeated upon a carpet in the midſt of the aſſembly. The whole building forms a ſquare of about 40 feet. The hall is in the centre, divided from four other apartments by wooden arches, upon pillars of the ſame materials. The walls above the arches were hung with European looking-glaſſes in gilt frames, and with pictures. On the left hand, as one enters, is the chancel, which is furniſhed with an altar covered with cloth of gold, raiſed a little above the ground in a declining poſition. About it were ſeveral flower-pots and roſe-water bottles, and three urns to receive the donations of the charitable. On a low deſk, near the altar, ſtood a great book, of folio ſize, from which ſome portions are daily read in the divine ſervice. When notice was given that it was *noon*, the congregation arranged themſelves upon the carpet on each ſide of the hall. The great book and deſk were brought from the altar, and placed at the oppoſite extremity. An old ſilver-haired man kneeled down before the deſk, with his face towards the altar, and by him ſat a man with a drum, and two or three with cymbals. The book was now opened, and the old man began to chant to the time of the inſtruments, and at the concluſion of every verſe moſt of the congregation joined chorus in a reſponſe, with countenances exhibiting great marks of joy. Their tones were not harſh; the time was quick; and Mr Wilkins learned that the ſubject was a hymn in praiſe of the unity, omnipreſence, and omnipotence of the Deity. The hymn concluded, the whole company got up and preſented their faces, with joined hands, towards the altar in the attitude of prayer. The prayer was a ſort of litany pronounced by a young man in a loud and diſtinct voice; the people joining, at certain periods, in a general reſponſe. This prayer was followed by a ſhort bleſſing from the old man, and an invitation to the aſſembly to partake of a friendly feaſt. A ſhare was offered to Mr Wilkins, who was too polite to refuſe it. It was a kind of ſweetmeat compoſed of ſugar and flower mixed up with clarified butter. They were next ſerved with a few ſugar plums; and thus ended the feaſt and ceremony.

Seeks.

In the courſe of converſation Mr Wilkins learned that the founder of this ſect was *Naneek Sah*, who lived about 400 years ago; who left behind him a book, compoſed by himſelf in verſe, containing the doctrines he had eſtabliſhed; that this book teaches, that there is but one God, filling all ſpace, and pervading all matter; and that there will be a day of retribution, when virtue will be rewarded, and vice puniſhed. (Our author forgot to aſk in what manner). It forbids murder, theft, and ſuch other deeds as are by the majority of mankind eſteemed crimes, and inculcates the practice of all the virtues; but, particularly, a univerſal philanthropy and hoſpitality to ſtrangers and travellers. It not only commands univerſal toleration, but forbids diſputes with thoſe of another perſuaſion. If any one ſhow a ſincere inclination to be admitted among them, any five or more Seeks being aſſembled in any place, even on the highway, they ſend to the firſt ſhop where ſweetmeats

Seeks, Segalien.

meals are ſold, and procure a very ſmall quantity of a particular kind called *batāſā* (Mr Wilkins does not tell us of what it is compoſed), which having diluted in pure water, they ſprinkle ſome of it on the body and eyes of the proſelyte, whilſt one of the beſt inſtructed repeats to him the chief canons of their faith, and exacts from him a ſolemn promiſe to abide by them the reſt of his life. They offered to admit Mr Wilkins into their ſociety; but he declined the honour, contenting himſelf with their alphabet, which they told him to guard as the apple of his eye, as it was a ſacred character. Mr Wilkins finds it but little different from the Dewanagari. The language itſelf is a mixture of Perſian, Arabic, and Shanſcrit, grafted upon the provincial dialect of Punjah, which is a kind of Hindowee, or, as we commonly call it, *Moors*.

SEGALIEN, a large iſland ſeparated from the coaſt of Chineſe Tartary by a narrow channel. It is called Tchoka by the natives, and Oku-Jeſſu by the Chineſe. It is ſituated between 46° and 54° N. Lat.; but its breadth from eaſt to weſt is unknown. The frigates under the command of Perouſe came to anchor in different bays, to the fineſt of which, in 48° 59′ N. Lat. and 140° 32′ E. Long. from Paris, the French commodore gave the name of Baie d'Eſtaing.

Segalien is well wooded, and mountainous towards the centre, but flat and level along the coaſt, the ſoil of which is peculiarly favourable to agriculture; and vegetation is extremely vigorous. The whole ſurface is almoſt covered with foreſts of pine, birch, oak, and willow trees; and the ſeas, rivers, and brooks, abound with excellent ſalmon and trout. In general, the weather is mild and foggy; and the inhabitants are healthy and ſtrong, and many of them live to an extreme old age. The preſents received by the natives from the French, were only valued in proportion to their utility. They make uſe of looms, which are complete inſtruments, though ſmall. The inhabitants in general do not exceed five feet in height, although ſome of the talleſt meaſure about five feet four inches. Their countenances are animated and agreeable; their cheeks are large, their noſe rounded at the extremity; they have ſtrong voices, and rather thick lips, which are of a dull red.

The women are not ſo tall as the men, but of a more rounded and delicate form, with dreſſes nearly ſimilar; their upper lip is tattoed all over of a blue colour; the hair of their head is black, ſmooth, and of a moderate ſtrength, worn about ſix inches long behind, and they cut it into a bruſh on the top of their head and over the temples. They wear ſurtouts of ſkin or quilted nankeen, which reaches to the calf of the leg, and ſometimes lower, by which the uſe of drawers is in a great meaſure rendered unneceſſary. They all wear girdles, like the lower orders among the Chineſe, from which a knife is ſuſpended as a defence againſt the bears, and a number of ſmall pockets for holding their flint and ſteel, pipe and box of tobacco, for they are very great ſmokers. Their huts are ſmall in proportion to the number of inhabitants they contain, but ſufficient to defend them againſt the rain and other inclemencies of the atmoſphere. The roof conſiſts of two inclined planes, from 10 to 12 feet high at their union, and three or four on the ſides; the breadth of the roof is 15, and its length 18 feet. They uſe iron pots in cooking, alſo ſhells, veſſels made of wood and birch bark, of different forms and workmanſhip. They have two meals a-day, the one at noon, and the other in the evening. Each family has its own hunting and fiſhing implements, and their arms are bows, javelins, and a kind of ſpontoon, which laſt is employed in hunting the bear. Segalien || Segni.

The only domeſtic animals are dogs, of a middling ſize, with ſhaggy hair, pricked ears, and a long ſharp muzzle, with a loud but not ſavage cry.

The people of Segalien are of a mild and unſuſpicious diſpoſition, and appear to hold a commercial intercourſe with the Chineſe through the medium of the Mantchou Tartars, with the Ruſſians to the north of their iſland, and the Japaneſe to the ſouth; but the articles of trade conſiſt only of a few furs and whale oil.

SEGEBERG, a town of Germany, in the duchy of Holſtein, and in Wagria; with a caſtle ſtanding on a high mountain, conſiſting of limeſtone, large quantities of which are carried to Hamburg and Lubeck. It belongs to Denmark, and is ſeated on the river Treve, in E. Long. 10. 9. N. Lat. 54. 0.

SEGEDIN, a ſtrong town of Lower Hungary, in the county of Czongrad, with a caſtle. The Imperialiſts took it from the Turks in 1686. It is ſeated at the confluence of the rivers Teſſe and Maſroch, in E. Long. 20. 35. N. Lat. 46. 28.

SEGMENT *of a* CIRCLE, in *Geometry*, is that part of the circle contained between a chord and an arch of the ſame circle.

SEGMENTS, LINE OF, two particular lines on Gunter's ſector. They lie between the lines of ſines and ſuperficies, and are numbered, 5, 6, 7, 8, 9, 10. They repreſent the diameter of a circle, ſo divided into 100 parts, that a right line drawn through theſe parts, and perpendicular to the diameter, ſhall cut the circle into two ſegments, the greater of which ſhall have the ſame proportion to the whole circle, as the parts cut off have to 100.

SEGNA, a city of Croatia, belonging to the houſe of Auſtria, and ſeated on the coaſt of the gulf of Venice. It was formerly a place of ſtrength and great importance; but it has ſuffered many calamities, and its inhabitants at preſent do not amount to 7000. In the beginning of this century it ſent 50 merchant ſhips to ſea; but the inconveniency of its ſituation and badneſs of its harbour, in which the ſea is never calm, diſcouraged navigation, and Segna has now very few ſhips belonging to it. Among the cuſtoms of the Segnans, Mr Fortis mentions one relative to the dead, which for its ſingularity may be worthy of notice.

"All the relations and friends of the family go to kiſs the corpſe, by way of taking leave, before burial. Each of them uncovers the face, over which a handkerchief is ſpread, more or leſs rich according to the family; having kiſſed the dead perſon, every one throws another handkerchief over the face; all which remain to the heirs, and ſometimes there are 20, 30, and more at this ceremony. Some throw all theſe handkerchiefs into the grave with the corpſe; and this, in former times, was the general cuſtom; but then they were rich. This ſeems to have been brought into uſe as a ſubſtitute for the ancient *vaſi lachrymatorii*." E. Long. 15. 21. N. Lat. 45. 22. *Fortis's Travels into Dalmatia.*

SEGNI, an ancient town of Italy, in the Campagna

Sego, Segovia.

of Rome, with a biſhop's ſee, and the title of duchy. It is ſaid that organs were firſt invented here. It is ſeated on a mountain. E. Long. 13. 15. N. Lat. 41. 50.

SEGO, the metropolis of the kingdom of Bambarra in Africa, on the banks of the Niger, in N. Lat. 14. 4. and W. Long. 2. 1. It conſiſts of four diſtinct towns, two on the northern bank of the river, called Sego Korro, and Sego Boo; and two on the ſouthern bank, called Sego Soo Korro, and Sego See Korro, all ſurrounded with lofty mud walls, and the houſes are conſtructed of clay, ſeveral of them two ſtories high, and even white-waſhed. Moſques are to be ſeen in every quarter, and the ſtreets, though narrow, are ſufficiently broad for every uſeful purpoſe, where wheel-carriages are wholly unknown. According to Mr Park, the inhabitants of Sego amount to 30,000; and it is the conſtant reſidence of the king of Bambarra, a conſiderable part of whoſe revenue ariſes from the fare given by paſſengers for croſſing the river. The people, however, are not ſo hoſpitable as in many other African towns, as the Moors are here very numerous, whoſe bigotry renders them the implacable enemies of every white man, if ſuſpected of being a Chriſtian.

Mr Park being therefore prohibited from living in Sego, reſided for three days in an adjacent village, and was diſmiſſed on the fourth, after receiving 5000 kowries from the king, to enable him to buy proviſions in the courſe of his journey; and although it amounted only to 20s. ſterling, ſo very cheap were the neceſſaries of life in Bambarra, that he found it ſufficient to procure proviſions for himſelf, and corn for his horſe, for not fewer than 50 days.

SEGORBE, a town of Spain, in the kingdom of Valencia, with the title of a duchy, and a biſhop's ſee. It is ſeated on the ſide of a hill, between the mountains, in a ſoil very fertile in corn and wine, and where there are quarries of fine marble. It was taken from the Moors in 1245; and the Romans thought it worth their while to carry ſome of the marble to Rome. W. Long. 0. 3. N. Lat. 39. 48.

SEGOVIA, an ancient city of Spain, of great power in the time of the Cæſars, is built upon two hills near the banks of the Arayda in Old Caſtile. W. Long. 3. 48. N. Lat. 41. 0. It is ſtill a biſhop's ſee, and is diſtinguiſhed for ſome venerable remains of antiquity. In the year 1525 the city contained 5000 families, but now they do not ſurpaſs 2000, a ſcanty population for 25 pariſhes; yet, beſide 21 churches and a cathedral, there are 21 convents.

The firſt object in Segovia that attracts the eye is the aqueduct, which the ſingular ſituation of the city renders neceſſary. As it is built upon two hills, and the valley by which they are ſeparated, and extends conſiderably in every direction, it was difficult for a part of the citizens to be ſupplied with water. The difficulty was removed, according to the opinion of the learned, in the reign of Trajan, by this aqueduct, which is one of the moſt aſtoniſhing and the beſt preſerved of the Roman works. In the opinion of Mr Swinburne, who ſurveyed it in 1776, and who ſeems to have given a very accurate account of the curioſities of Segovia, it is ſuperior in elegance of proportion to the Pont du Gard at Niſmes. It is ſo perfectly well preſerved, that it does not ſeem leaky in any part. From the firſt low arches to the reſervoir in the town, its length is 2400 Spaniſh feet; its greateſt height (in the Plaza del Azobejo at the foot of the walls) is 104; it is there compoſed of a double row of arches, built of large ſquare ſtones without mortar, and over them a hollow wall of coarſer materials for the channel of the water, covered with large oblong flags. Of the lower range of arcades, which are 15 feet wide by 65 high, there are 42. The upper arches are 119 in number, their height 27 Spaniſh feet, their breadth ſeventeen, the tranſverſal thickneſs, or depth of the piers, eight feet.

Swinburne's Travels through Spain.

Segovia.

The cathedral is a mixture of the Gothic and Mooriſh architecture. The inſide is very ſpacious and of majeſtic ſimplicity. The windows are well diſpoſed, and the great altar has been lately decorated with the fineſt Grenadan marble. But it is to be regretted, that in this cathedral, as well as in moſt others of Spain, the choir is placed in the middle of the nave. The church is nearly upon the model of the great church of Salamanca, but it is not ſo highly finiſhed.

Travels in Spain by the Chev. de Bourgoanne.

The alcazar, or ancient palace of the Moors, ſtands in one of the fineſt poſitions poſſible, on a rock riſing above the open country. A fine river waſhes the foot of the precipice, and the city lies admirably well on each ſide on the brow of the hill; the declivity is woody, and the banks charmingly rural; the ſnowy mountains and dark foreſts of Saint Ildefonzo compoſe an awful back-ground to the picture. Towards the town there is a large court before the great outward tower, which, as the priſon of Gil Blas, is ſo well deſcribed by Le Sage, that the ſubject requires no farther explanation. The reſt of the buildings form an antique palace, which has ſeldom been inhabited by any but priſoners ſince the reign of Ferdinand and Iſabella, who were much attached to this ſituation. There are ſome magnificent halls in it, with much gilding in the ceilings, in a ſemibarbarous taſte. All the kings of Spain are ſeated in ſtate along the cornice of the great ſaloon; but it is doubtful whether they are like the princes whoſe names they bear; if that reſemblance, however, be wanting, they have no other merit to claim. The royal apartments are now occupied by a college of young gentlemen cadets, educated at the king's expence in all the ſciences requiſite for forming an engineer. The grandmaſter of the ordnance reſides at Segovia, which is the head eſtabliſhment of the Spaniſh artillery.

The mint is below the alcazar, a large building, the moſt ancient place of coinage in the kingdom. The machines for melting, ſtamping, and milling the coin, are worked by water: but there is reaſon to believe that Seville has at preſent more buſineſs, as being nearer the ſource of riches, the port of Cadiz, where the ingots of America are landed.

The unevenneſs of the crown of the hill gives a wild look to this city. Moſt of the ſtreets are crooked and dirty, the houſes wooden and very wretched; nor do the inhabitants appear much the richer for their cloth manufactory. Indeed, it is not in a very flouriſhing condition, but what cloth they make is very fine.

The country about Segovia has the reputation of being the beſt for rearing the kind of ſheep that produces the beautiful Spaniſh wool; but as thoſe flocks wander over many other parts of the kingdom, Segovia ſeems to have no excluſive title to this reputation. Segovia (ſays Mr Townſend, whoſe valuable travels will be read with much pleaſure) was once famous for its cloth made on the

Segovia
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Sejanus.

the king's account; but other nations have since become rivals in this branch, and the manufacture in this city has been gradually declining. When the king gave it up to a private company, he left about 3000l. in trade; but now he is no longer a partner in the business. In the year 1612 were made here 25,500 pieces of cloth, which consumed 44,625 quintals of wool, employed 34,189 persons; but at present they make only about 4000 pieces. The principal imperfections of this cloth are, that the thread is not even, and that much grease remains in it when it is delivered to the dyer; in consequence of which the colour is apt to fail. Yet, independently of imperfections, so many are the disadvantages under which the manufacture labours, that foreigners can afford to pay 3l. for the aroba of fine wool, for which the Spaniard gives no more than 20s. and after all his charges can command the market even in the ports of Spain.

Townsend's Journey through Spain.

SEGOVIA, *New*, a town of North America, in New Spain, and in the audience of Guatimala; seated on the river Yare, on the confines of the province of Honduras. W. Long. 84. 30. N. Lat. 13. 25.

SEGOVIA, a town of America, in Terra Firma, and in the province of Venezuela, seated on a river, near a very high mountain, where there are mines of gold. W. Long. 65. 30. N. Lat. 8. 20.

SEGOVIA, a town of Asia, in the island of Manila, and one of the largest of the Philippines, seated at the north end of the island, 240 miles north of Manila, and subject to Spain. E. Long. 120. 59. N. Lat. 18. 36.

SEGREANT, is the herald's word for a griffin when drawn in a leaping posture, and displaying his wings as if ready to fly.

SEGUE, in the Italian music, is often found before *aria*, *alleluja*, *amen*, &c. to show that those portions or parts are to be sung immediately after the last note of that part over which it is writ; but if these words *si placet*, or *ad libitum*, are joined therewith, it signifies, that these portions may be sung or not at pleasure.

SEGUIERIA, a genus of plants belonging to the class polyandria. See BOTANY *Index*.

SEJANT, a term used in heraldry, when a lion, or other beast, is drawn in an escutcheon sitting like a cat with his fore-feet straight.

SEJANUS, ÆLIUS, a native of Vulsinum in Tuscany, who distinguished himself in the court of Tiberius. His father's name was Seius Strabo; a Roman knight, commander of the pretorian guards. His mother was descended from the Junian family. Sejanus first gained the favour of Caius Cæsar, the grandson of Augustus, but afterwards he attached himself to the interest and the views of Tiberius, who then sat on the imperial throne. The emperor, who was naturally of a suspicious temper, was free and open with Sejanus, and while he distrusted others, he communicated his greatest secrets to this fawning favourite. Sejanus improved this confidence; and when he had found that he possessed the esteem of Tiberius, he next endeavoured to become the favourite of the soldiers, and the darling of the senate. As commander of the pretorian guards he was the second man in Rome, and in that important office he made use of insinuations and every mean artifice to make himself beloved and revered. His affability and condescension gained him the hearts of the common soldiers, and, by appointing his own favourites and adherents to places of trust and honour, all the officers and centurions of the army became devoted to his interest. The views of Sejanus in this were well known; yet, to advance with more success, he attempted to gain the affection of the senators. In this he met with no opposition. A man who has the disposal of places of honour and dignity, and who has the command of the public money, cannot but be the favourite of those who are in need of his assistance. It is even said, that Sejanus gained to his views all the wives of the senators, by a private and most sacred promise of marriage to each of them, whenever he had made himself independent and sovereign of Rome. Yet, however successful with the best and noblest families in the empire, Sejanus had to combat numbers in the house of the emperor; but these seeming obstacles were soon removed. All the children and grandchildren of Tiberius were sacrificed to the ambition of the favourite under various pretences; and Drusus the son of the emperor, by striking Sejanus, made his destruction sure and inevitable. Livia, the wife of Drusus, was gained by Sejanus; and, though the mother of many children, she was prevailed upon to assist her adulterer in the murder of her husband, and she consented to marry him when Drusus was dead. No sooner was Drusus poisoned, than Sejanus openly declared his wish to marry Livia. This was strongly opposed by Tiberius; and the emperor, by recommending Germanicus to the senators for his successor, rendered Sejanus bold and determined. He was more urgent in his demands; and, when he could not gain the consent of the emperor, he persuaded him to retire to solitude from the noise of Rome and the troubles of the government. Tiberius, naturally fond of ease and luxury, yielded to his representations, and retired to Campania, leaving Sejanus at the head of the empire. This was highly gratifying to the favourite, but he was not without a master. Prudence and moderation might have made him what he wished to be; but having offended the emperor beyond forgiveness, he resolved to retrieve his loss, and by one vigorous effort to decide the fate of the empire. He called together his friends and followers; he paid court to such as seemed disaffected; he held forth rewards and promises; and, having increased the number of his partisans, formed a bold conspiracy, resolved by any means to seize the sovereign power.

Sejanus.

Lempriere's Dictionary.

A powerful league was formed with astonishing rapidity, and great numbers of all descriptions, senators as well as military men, entered into the plot. Among these, Satrius Secundus was the confidential friend and prime agent of the minister. Whatever was this man's motive, whether fear, or views of interest, or ingratitude (for no principle of honour can be imputed to him), he resolved to betray the secret to Tiberius. For this purpose he addressed himself to Antonia, the daughter of Anthony the triumvir, the widow of Drusus, and the mother of Germanicus. When this illustrious woman, who was honoured by the court and revered by the people, heard the particulars, she sent dispatches to the emperor by one of her slaves. Tiberius was astonished, but not dismayed. The danger pressed; his habitual slowness was out of season; the time called for vigour and decisive measures. He sent Macro to Rome, with a special commission to take upon him the command of the prætorian guards. He added full instructions for

Murphy's Tacitus, Book v.

Sejanus. his conduct in all emergencies. Early in the morning on the 15th, before the kalends of November, a report was ſpread, that letters had arrived at Rome, in which the emperor ſignified his intentions to aſſociate Sejanus with himſelf in the tribunitian power. The ſenate was ſummoned to meet in the temple of Apollo, near the imperial palace. Sejanus attended without delay. A party of the prætorians followed him. Macro met him in the veſtibule of the temple. He approached the miniſter with all demonſtrations of profound reſpect, and taking him aſide, "Be not ſurpriſed (he ſaid) that you have no letter from the prince: it is his pleaſure to declare you his colleague in the tribunitian power; but he thinks that a matter of ſo much importance ſhould be communicated to the fathers by the voice of the conſuls. I am going to deliver the emperor's orders." Sejanus, elated with joy, and flushed with his new dignity, entered the ſenate-houſe; Macro followed him. As ſoon as the conſuls arrived, he delivered the letter from Tiberius, and immediately went forth to the prætorian guards. He informed them, that by order of the prince, a large donative was to be diſtributed among the ſoldiers. He added, that, by a new commiſſion, he himſelf was appointed their commanding officer; and, if they followed him to the camp, they would there receive the promiſed bounty. The lure was not thrown out in vain: the prætorian guards quitted their ſtation. Laco, who ſtood near at hand, immediately ſurrounded the ſenate-houſe with a body of the city cohorts.

The letter to the conſuls was confuſed, obſcure, and tedious, only glancing at Sejanus, till at laſt the language of invective left no room for doubt. Sejanus kept his ſeat like a man benumbed, ſenſeleſs and ſtupid with aſtoniſhment. His friends, who a little before congratulated him on his new dignity, deſerted him on every ſide. He was commanded by the conſul to riſe and follow him, and being loaded with irons, was conducted to priſon. His downfal filled the city with exultation. The populace, who worſhipped him in the hour of proſperity, rejoiced to ſee the ſad cataſtrophe to which he was now reduced. They followed in crowds, rending the air with ſhouts, and pouring forth a torrent of abuſe and ſcurrilous language. The priſoner endeavoured to hide his face; but the mob delighted to ſee remorſe and ſhame and guilt and horror in every feature of his diſtracted countenance. They reviled him for his acts of cruelty; they laughed at his wild ambition; they tore down his images, and daſhed his ſtatues to pieces. He was doomed by Tiberius to ſuffer death on that very day; but, as he had a powerful faction in the ſenate, it was not thought adviſeable, for the mere formality of a regular condemnation, to hazard a debate. Private orders were given to Macro to diſpatch him without delay; but the conſul, ſeeing the diſpoſitions of the people, and the calm neutrality of the prætorian guards, judged it beſt to re-aſſemble the fathers. They met in the temple of Concord. With one voice Sejanus was condemned to die, and the ſentence was executed without delay. He was ſtrangled in the priſon. His body was dragged to the Gemoniæ, and, after every ſpecies of inſult from the populace, at the end of three days was thrown into the Tiber. Such was the tragic end of that ambitious favourite. He fell a terrible example to all, who, in any age or country, may hereafter endeavour by their vices to riſe above their fellow-citizens.

Seignior || Seiſin.

SEIGNIOR, is, in its general ſignification, the ſame with *lord*, but is particularly uſed for the lord of the fee as of a manor, as *ſeigneur* among the feudiſts is he who grants a fee or benefit out of the land to another; and the reaſon is, becauſe having granted away the uſe and profit of the land, the property or dominion he ſtill retains in himſelf.

SEIGNIORAGE, is a royalty or prerogative of the king, whereby he claims an allowance of gold and ſilver brought in the maſs to be exchanged for coin. As ſeigniorage, put of every pound weight of gold, the king had for his coin 5s. of which he paid to the maſter of the mint ſometimes 1s. and ſometimes 1s. 6d. Upon every pound weight of ſilver, the ſeigniorage anſwered to the king in the time of Edward III. was 18 pennyweights, which then amounted to about 1s. out of which he ſometimes paid 8d. at others 9d. to the maſter. In the reign of King Henry V. the king's ſeigniorage of every pound of ſilver was 15d. &c.

SEIGNIORY, is borrowed from the French *ſeigneurie*, i. e. *dominatus*, *imperium*, *principatus*; and ſignifies with us a manor or lordſhip, *ſeigniory de ſokemans*. *Seigniory in groſs*, ſeems to be the title of him who is not lord by means of any manor, but immediately in his own perſon; as *tenure in capite*, whereby one holds of the king, as of his crown, is *ſeigniory in groſs*.

SEIKS. See HINDOSTAN.

SEISIN, in *Law*, ſignifies poſſeſſion. In this ſenſe we ſay, *premier ſeiſin*, for the firſt poſſeſſion, &c.

Seiſin is divided into that *in deed* or *in fact*, and that *in law*. A ſeiſin in *deed* is where a poſſeſſion is actually taken: but a ſeiſin in *law* is, where lands deſcend, and the party has not entered thereon; or, in other words, it is where a perſon has a right to lands, &c. and is by wrong diſſeiſed of them. A ſeiſin in law is held to be ſufficient to avow on; though to the bringing of an aſſize, actual ſeiſin is required; and where ſeiſin is alleged, the perſon pleading it muſt ſhow of what eſtate he is ſeiſed, &c.

Seiſin of a ſuperior ſervice is deemed to be a ſeiſin of all ſuperior and caſual ſervices that are incident thereto; and ſeiſin of a leſſee for years, is ſufficient for him in reverſion.

Livery of SEISIN, in *Law*, an eſſential ceremony in the conveyance of landed property; being no other than the pure feodal inveſtiture, or delivery of corporal poſſeſſion of the land or tenement. This was held abſolutely neceſſary to complete the donation; *Nam feudum ſine inveſtitura nullo modo conſtitui potuit*: and an eſtate was then only perfect when, as Fleta expreſſes it in our law, *fit juris et ſeiſinæ conjunctio*. See FEOFMENT.

Inveſtitures, in their original riſe, were probably intended to demonſtrate in conquered countries the actual poſſeſſion of the lord; and that he did not grant a bare litigious right, which the ſoldier was ill qualified to proſecute, but a peaceable and firm poſſeſſion. And, at a time when writing was ſeldom practiſed, a mere oral gift, at a diſtance from the ſpot that was given, was not likely to be either long or accurately retained in the memory of byſtanders, who were very little intereſted in the grant. Afterwards they were retained as a public and notorious act, that the country might take notice of and teſtify

Seiſin. teſtify the transfer of the eſtate; and that ſuch as claimed title by other means might know againſt whom to bring their actions. Seiſin.

In all well-governed nations, ſome notoriety of this kind has been ever held requiſite, in order to acquire and aſcertain the property of lands. In the Roman law, *plenum dominium* was not ſaid to ſubſiſt unleſs where a man had both the *right* and the *corporal poſſeſſion*; which poſſeſſion could not be acquired without both an actual intention to poſſeſs, and an actual ſeiſin or entry into the premiſſes, or part of them in the name of the whole. And even in eccleſiaſtical promotions, where the freehold paſſes to the perſon promoted, corporal poſſeſſion is required at this day to veſt the property completely in the new proprietor; who, according to the diſtinction of the canoniſts, acquires the *jus ad rem*, or inchoate and imperfect right, by nomination and inſtitution; but not the *jus in re*, or complete and full right, unleſs by corporal poſſeſſion. Therefore in dignities poſſeſſion is given by inſtalment; in rectories and vicarages by induction; without which no temporal rights accrue to the miniſter, though every eccleſiaſtical power is veſted in him by inſtitution. So alſo even in deſcents of lands, by our law, which are caſt on the heir by act of the law itſelf, the heir has not *plenum dominium*, or full and complete ownerſhip, till he has made an actual corporal entry into the lands: for if he dies before *entry* made, *his* heir ſhall not be entitled to take the poſſeſſion, but the heir of the perſon who was laſt actually ſeiſed. It is not therefore only a mere right to enter, but the actual entry, that makes a man complete owner; ſo as to tranſmit the inheritance to his own heirs: *non jus, ſed ſeiſina, facit ſtipitem.*

Yet the corporal tradition of lands being ſometimes inconvenient, a ſymbolical delivery of poſſeſſion was in many caſes anciently allowed; by transferring ſomething near at hand, in the preſence of credible witneſſes, which by agreement ſhould ſerve to repreſent the very thing deſigned to be conveyed; and an occupancy of this ſign or ſymbol was permitted as equivalent to occupancy of the land itſelf. Among the Jews we find the evidence of a purchaſe thus defined in the book of Ruth: "Now this was the manner in former time in Iſrael, concerning redeeming and concerning changing, for to confirm all things: a man plucked off his ſhoe, and gave it to his neighbour; and this was a teſtimony in Iſrael." Among the ancient Goths and Swedes, contracts for the ſale of lands were made in the preſence of witneſſes, who extended the cloak of the buyer, while the ſeller caſt a clod of the land into it, in order to give poſſeſſion; and a ſtaff or wand was alſo delivered from the vender to the vendee, which paſſed through the hands of the witneſſes. With our Saxon anceſtors the delivery of a turf was a neceſſary ſolemnity to eſtabliſh the conveyance of lands. And, to this day, the conveyance of our copyhold eſtates is uſually made from the ſeller to the lord or his ſteward by delivery of a rod or verge, and then from the lord to the purchaſer by re-delivery of the ſame in the preſence of a jury of tenants.

Conveyances in writing were the laſt and moſt refined improvement. The mere delivery of poſſeſſion, either actual or ſymbolical, depending on the ocular teſtimony and remembrance of the witneſſes, was liable to be forgotten or miſrepreſented, and became frequently incapable of proof. Beſides, the new occaſions and neceſſities introduced by the advancement of commerce, required means to be deviſed of charging and incumbering eſtates, and of making them liable to a multitude of conditions and minute deſignations, for the purpoſes of raiſing money, without an abſolute ſale of the land; and ſometimes the like proceedings were found uſeful in order to make a decent and competent proviſion for the numerous branches of a family, and for other domeſtic views. None of which could be effected by a mere, ſimple, corporal transfer of the ſoil from one man to another, which was principally calculated for conveying an abſolute unlimited dominion. Written deeds were therefore introduced, in order to ſpecify and perpetuate the peculiar purpoſes of the party who conveyed: yet ſtill, for a very long ſeries of years, they were never made uſe of, but in company with the more ancient and notorious method of transfer by delivery of corporal poſſeſſion.

Livery of ſeiſin, by the common law, is neceſſary to be made upon every grant of an eſtate of freehold in hereditaments corporeal, whether of inheritance or for life only. In hereditaments incorporeal it is impoſſible to be made; for they are not the object of the ſenſes: and in leaſes for years, or other chattel intereſts, it is not neceſſary. In leaſes for years indeed an actual *entry* is neceſſary, to veſt the eſtate in the leſſee: for a bare leaſe gives him only a right to enter, which is called his intereſt in the term, or *intereſſe termini*: and when he enters in purſuance of that right, he is then, and not before, in poſſeſſion of his term, and complete tenant for years. This entry by the tenant himſelf ſerves the purpoſe of notoriety, as well as livery of ſeiſin from the granter could have done; which, it would have been improper to have given in this caſe, becauſe that ſolemnity is appropriated to the conveyance of a freehold. And this is one reaſon why freeholds cannot be made to commence *in futuro*, becauſe they cannot (at the common law) be made but by livery of ſeiſin; which livery, being an actual manual tradition of the land, muſt take effect *in præſenti*, or not at all.

Livery of ſeiſin is either in *deed* or in *law*.

Livery in *deed* is thus performed. The feoffor, leſſor, or his attorney, together with the feoffee, leſſee, or his attorney, (for this may as effectually be done by deputy or attorney as by the principals themſelves in perſon), come to the land or to the houſe; and there, in the preſence of witneſſes, declare the contents of the feoffment or leaſe on which livery is to be made. And then the feoffor, if it be of land, doth deliver to the feoffee, all other perſons being out of the ground, a clod or turf, or a twig or bough there growing, with words to this effect: "I deliver theſe to you in the name of ſeiſin of all the lands and tenements contained in this deed." But, if it be of a houſe, the feoffor muſt take the ring or latch of the door, the houſe being quite empty, and deliver it to the feoffee in the ſame form; and then the feoffee muſt enter alone, and ſhut the door, and then open it, and let in the others. If the conveyance or feoffment be of divers lands, lying ſcattered in one and the ſame county, then in the feoffor's poſſeſſion, livery of ſeiſin of any parcel, in the name of the reſt, ſufficeth for all; but if they be in ſeveral counties, there muſt be as many liveries as there are counties. For, if the title to theſe lands comes to be diſputed, there muſt

Seiſin
||
Selden.

muſt be as many trials as there are counties, and the jury of one county are no judges of the notoriety of a fact in another. Beſides, anciently, this ſeiſin was obliged to be delivered *coram paribus de vicincto*, before the peers or freeholders of the neighbourhood, who atteſted ſuch delivery in the body or on the back of the deed; according to the rule of the feodal law, *Pares debent intereſſe inveſtituræ feudi, et non alii:* for which this reaſon is expreſsly given; becauſe the peers or vaſſals of the lord, being bound by their oath of fealty, will take care that no fraud be committed to his prejudice, which ſtrangers might be apt to connive at. And though afterwards the ocular atteſtation of the *pares* was held unneceſſary, and livery might be made before any credible witneſſes, yet the trial, in caſe it was diſputed, (like that of all other atteſtations), was ſtill reſerved to the *pares* or jury of the county. Alſo, if the lands be out on leaſe, though all lie in the ſame county, there muſt be as many liveries as there are tenants: becauſe no livery can be made in this caſe, but by the conſent of the particular tenant; and the conſent of one will not bind the reſt. And in all theſe caſes it is prudent, and uſual, to endorſe the livery of ſeiſin on the back of the deed, ſpecifying the manner, place, and time of making it; together with the names of the witneſſes. And thus much for livery in deed.

Livery in *law* is where the ſame is not made *on* the land, but *in ſight of it* only; the feoffor ſaying to the feoffee, "I give you yonder land, enter and take poſſeſſion." Here, if the feoffee enters during the life of the feoffor, it is a good livery, but not otherwiſe; unleſs he dares not enter through fear of his life or bodily harm; and then his continual claim, made yearly in due form of law, as near as poſſible to the lands, will ſuffice without an entry. This livery in law cannot, however, be given or received by attorney, but only by the parties themſelves.

SEIZE, in the ſea-language, is to make faſt or bind, particularly to faſten two ropes together with rope-yarn. The ſeizing of a boat is a rope tied to a ring or little chain in the fore-ſhip of the boat, by which means it is faſtened to the ſide of the ſhip.

SEIZURE, in commerce, an arreſt of ſome merchandiſe, moveable, or other matter, either in conſequence of ſome law or of ſome expreſs order of the ſovereign. Contraband goods, thoſe fraudulently entered, or landed without entering at all, or at wrong places, are ſubject to ſeizure. In ſeizures among us, one half goes to the informer, and the other half to the king.

SELAGO, a genus of plants belonging to the didynamia claſs; and in the natural method ranking under the 48th order, *Aggregatæ*. See BOTANY *Index*.

SELDEN, JOHN, called by Grotius *the glory of England*, was born at Salvington in Suſſex in 1584. He was educated at the free ſchool at Chicheſter; whence he was ſent to Hart Hall in the univerſity of Oxford, where he ſtaid four years. In 1612, he entered himſelf in Clifford's Inn, in order to ſtudy the law; and about two years after removed to the Inner Temple, where he ſoon acquired great reputation by his learning. He had already publiſhed ſeveral of his works; and this year wrote verſes in Latin, Greek, and Engliſh, upon Mr William Browne's Britannia's Paſtorals. In 1614, he publiſhed his Titles of Honour; and in 1616, his Notes on Sir John Forteſcue's book *De Laudibus Legum Angliæ*. In 1618, he publiſhed his Hiſtory of Tythes; which gave great offence to the clergy, and was animadverted upon by ſeveral writers; and for that book he was called before the high commiſſion court, and obliged to make a public acknowledgment of his ſorrow for having publiſhed it. In 1621, being ſent for by the parliament, though he was not then a member of that houſe, and giving his opinion very ſtrongly in favour of their privileges in oppoſition to the court, he was committed to the cuſtody of the ſheriff of London, but was ſet at liberty after five weeks confinement. In 1623, he was choſen burgeſs for Lancaſter; but, amidſt all the diviſions of the nation, kept himſelf neuter, proſecuting his ſtudies with ſuch application, that though he was the next year choſen reader of Lyon's Inn, he refuſed to perform that office. In 1625, he was choſen burgeſs for Great Bedwin in Wiltſhire, to ſerve in the firſt parliament of King Charles I. in which he declared himſelf warmly againſt the duke of Buckingham; and on his Grace's being impeached by the Houſe of Commons, was appointed one of the managers of the articles againſt him. In 1627 and 1628, he oppoſed the court party with great vigour. The parliament being prorogued to January 20. 1629, Mr Selden retired to the earl of Kent's houſe at Wreſt, in Bedfordſhire, where he finiſhed his *Marmora Arundeliana*. The parliament being met, he, among others, again diſtinguiſhed himſelf by his zeal againſt the court; when the king diſſolving the parliament, ordered ſeveral of the members to be brought before the King's Bench bar, and committed to the Tower. Among theſe was Mr Selden, who inſiſting on the benefit of the laws, and refuſing to make his ſubmiſſion, was removed to the King's Bench priſon. Being here in danger of his life on account of the plague then raging in Southwark, he petitioned the lord high treaſurer, at the end of Trinity term, to intercede with his Majeſty that he might be removed to the Gate-houſe, Weſtminſter, which was granted: but in Michaelmas term following, the judges objecting to the lord treaſurer's warrant, by which he had been removed to the Gate-houſe, an order was made for conveying him back to the King's Bench, whence he was releaſed in the latter end of the ſame year; but fifteen years after, the parliament ordered him 5000l. for the loſſes he had ſuſtained on this occaſion. He was afterwards committed with ſeveral other gentlemen, for diſperſing a libel; but the author, who was abroad, being diſcovered, they were at length ſet at liberty. In 1634, a diſpute ariſing between the Engliſh and Dutch concerning the herring-fiſhery on the Britiſh coaſt, he was prevailed upon by Archbiſhop Laud to draw up his *Mare Clauſum*, in anſwer to Grotius's *Mare Liberum*: which greatly recommended him to the favour of the court. In 1640, he was choſen member for the univerſity of Oxford; when he again oppoſed the court, though he might, by complying, have raiſed himſelf to very conſiderable poſts. In 1643, he was appointed one of the lay-members to ſit in the aſſembly of divines at Weſtminſter, and was the ſame year appointed keeper of the records in the Tower. Whilſt he attended his duty in the aſſembly, a warm debate aroſe reſpecting the diſtance of Jericho from Jeruſalem. The party which contended for the ſhorteſt diſtance, urged, as a

Selden.

proof

Selden || Seleucus.

proof of their opinion being well founded, that fiſhes were carried from the one city to the other, and ſold in the market. Their adverſaries were ready to yield to the force of this concluſive argument, when Selden, who deſpiſed both parties, as well as the frivolouſneſs of their diſpute, exclaimed, "Perhaps the fiſhes were ſalted!" This unexpected remark left the victory doubtful, and renewed the debate; and our author, who was ſick of ſuch trifling, ſoon found employment more ſuited to his genius; for, in 1645, he was made one of the commiſſioners of the admiralty. The ſame year he was unanimouſly elected maſter of Trinity college, Cambridge; but declined accepting. He died in 1654; and was interred in the Temple-church, where a monument is erected to his memory. Dr Wilkes obſerves, that he was a man of uncommon gravity and greatneſs of ſoul, averſe to flattery, liberal to ſcholars, charitable to the poor; and though he had great latitude in his principles with regard to eccleſiaſtical power, yet he had a ſincere regard for the church of England. He wrote many learned works beſides thoſe already mentioned; the principal of which are, 1. *De Jure Naturali et Gentium juxta Diſciplinam Hebræorum.* 1. *De Nuptiis et Divorciis.* 3. *De Anno Civili veterum Hebræorum.* 4. *De Nummis.* 5. *De Diis Syris.* 6. *Uxor Hebraica.* 7. *Jani Anglorum Facies altera*, &c. All his works were printed together in 1726, in 3 vols folio.

SELENITE, in *Mineralogy*, the cryſtallized ſulphate of lime or gypſum. See LIME, in MINERALOGY *Index*. Selenite literally ſignifies *moon-ſtone*, and is preſſive of the colour and ſoft luſtre of the mineral.

SELENOGRAPHY, a branch of coſmography, which deſcribes the moon and all the parts and appearances thereof, as geography does thoſe of the earth. See MOON, and ASTRONOMY *Index*.

SELEUCIA, in *Ancient Geography*, ſurnamed *Babylonia*, becauſe ſituated on its confines, at the confluence of the Euphrates and Tigris. Ptolemy places it in Meſopotamia. It is called alſo *Seleucia ad Tigrim*, (Polybius, Strabo, Iſidorus Characenus); waſhed on the ſouth by the Euphrates, on the eaſt by the Tigris, (Theophylactus); generally agreed to have been built or enlarged by Seleucus Nicanor, maſter of the eaſt after Alexander; by means of which Babylon came to be deſerted. It is ſaid to have been originally called *Coche*, (Ammian, Eutropius); though others, as Arrian, diſtinguiſh it, as a village, from *Selucia*: and, according to Zoſimus, the ancient name of Selucia was *Zochaſia*. Now called *Bagdad*. E. Long. 44. 21. N. Lat. 33. 10. There were many other cities of the ſame name, all built by Seleucus Nicanor.

SELEUCIDÆ, in *Chronology*. Era of the Seleucidæ, or the Syro-Macedonian era, is a computation of time, commencing from the eſtabliſhment of the Seleucidæ, a race of Greek kings, who reigned as ſucceſſors of Alexander the Great in Syria, as the Ptolemies did in Egypt. This era we find expreſſed in the books of the Maccabees, and on a great number of Greek medals ſtruck by the cities of Syria, &c. The Rabbins call it the *era of contracts*, and the Arabs *therik dilkarnain*, that is, the "era of the two horns." According to the beſt accounts, the firſt year of this era falls in the year 311 B. C. being 12 years after Alexander's death.

SELEUCUS, NICANOR, one of the chief generals under Alexander the Great, and, after his death, founder of the race of princes called *Seleucidæ*. He is equally celebrated as a renowned warrior, and as the father of his people; yet his virtues could not protect him from the fatal ambition of Ceraunus, one of his courtiers, by whom he was aſſaſſinated 280 B. C.

Seleucus || Self.

SELF-HEAL, the PRUNELLA VULGARIS, Lin. This herb was recommended by the older phyſicians as a mild reſtringent and vulnerary; but its virtues appear to be very feeble, and therefore it is now rarely uſed.

SELF-Command, is that ſteady equanimity which enables a man in every ſituation to exert his reaſoning faculty with coolneſs, and to do what the preſent circumſtances require. It depends much upon the natural temperament of the body, and much upon the moral cultivation of the mind. He who enjoys good health, and has braced his frame by exerciſe, has always a greater command of himſelf than a man of equal mental powers, who has ſuffered his conſtitution to become relaxed by indolence; and he who has from his early youth been accuſtomed to make his paſſions ſubmit to his reaſon, muſt, in any ſudden emergency, be more capable of acting properly than he who has tamely yielded to his paſſion. Hence it is that recluſe and literary men, when forced into the buſtle of public life, are incapable of acting where promptneſs is requiſite; and that men who have once or twice yielded to a ſenſe of impending danger ſeldom acquire afterwards that command of themſelves which may be neceſſary to extricate them from ſubſequent dangers. In one of the earlieſt battles fought by the late king of Pruſſia, the ſovereign was among the firſt men who quitted the field: had he behaved in the ſame manner a ſecond and a third time, he would never have become that hero whoſe actions aſtoniſhed Europe. A celebrated engineer among ourſelves, who was well known to the writer of this ſhort article, had little ſcience, and was a ſtranger to the principles of his own art; but being poſſeſſed of a firm and vigorous frame, and having been accuſtomed to ſtruggle with dangers and difficulties, he had ſuch a conſtant command of himſelf, as enabled him to employ with great coolneſs every neceſſary reſource in the day of battle.

But it is not only in battle, and in the face of immediate danger, that ſelf-command is neceſſary to enable a man to act with propriety. There is no ſituation in life where difficulties, greater or leſs, are not to be encountered; and he who would paſs through life with comfort to himſelf, and with utility to the public, muſt endeavour to keep his paſſions in conſtant ſubjection to his reaſon. No man can enjoy without inquietude what he cannot loſe without pain; and no man who is overwhelmed with deſpondency under any ſudden misfortune can exert the talents neceſſary to retrieve his circumſtances. We ought, therefore, by every means to endeavour to obtain a conſtant command of ourſelves; and nowhere ſhall we find better leſſons for this purpoſe than in ancient Lacedemon. There certain occupations were appointed for each ſex, for every hour, and for every ſeaſon of life. In a life always active, the paſſions have no opportunity to deceive, ſeduce, or corrupt; and the nervous ſyſtem acquires a firmneſs which makes it a fit inſtrument to a vigorous mind.

SELF-Defence implies not only the preſervation of one's life, but alſo the protection of his property, becauſe

Self. cauſe without property life cannot be preſerved in a civilized nation. The extent of property eſſential to life is indeed ſmall, and this conſideration may enable us to decide a queſtion which ſome moraliſts have made intricate. By what means, it has been aſked, may a man protect his property? May he kill the perſon who attacks it, if he cannot otherwiſe repel the attack?

That a man, in the ſtate of nature, may kill the perſon who makes an attack on his life, if he cannot otherwiſe repel the attack, is a truth which has never been controverted; and he may do the ſame in civil ſociety, if his danger be ſo imminent that it cannot be averted by the interpoſition of the protection provided for individuals by the ſtate. In all poſſible ſituations, except the three following, whatever is abſolutely neceſſary to the preſervation of life may be lawfully performed, for the law of ſelf-preſervation is the firſt and moſt ſacred of thoſe laws which are impreſſed on every mind by the author of nature.

The three excepted ſituations are thoſe of a ſoldier in the day of battle, of a criminal about to ſuffer by the laws of his country, and of a man called upon to renounce his religion. The ſoldier hazards his life in the moſt honourable of all cauſes, and cannot betray his truſt, or play the coward, without incurring a high degree of moral turpitude. He knows that the very profeſſion in which he is engaged neceſſarily ſubjects him to danger; and he voluntarily incurred that danger for the good of his country, which, with great propriety, annexes to his profeſſion peculiar privileges and much glory. The criminal under ſentence of death cannot, without adding to his guilt, reſiſt the execution of that ſentence; for the power of inflicting puniſhment is eſſential to ſociety, and ſociety is the ordinance of God, (ſee SOCIETY). The man who is called upon to renounce his religion ought to ſubmit to the cruelleſt death rather than comply with that requeſt, ſince religion is his only ſecurity for future and permanent happineſs. But in every other ſituation, that which is abſolutely neceſſary to the preſervation of life is undoubtedly lawful. Hence it is, that a perſon ſinking in water is never thought to be guilty of any crime, though he drag his neighbour after him by his endeavours to ſave himſelf; and hence, too, a man in danger of periſhing by ſhipwreck may drive another from a plank which cannot carry them both, for ſince one of two lives muſt be loſt, no law, human or divine, calls upon either of them to prefer his neighbour's life to his own.

But though the rights of ſelf-defence authoriſe us to repel every attack made upon our life, and in caſes of extremity to ſave ourſelves at the expence of the life of our innocent neighbour, it is not ſo evident that, rather than give to an unjuſt demand a few ſhillings or pounds, we may lawfully deprive a fellow creature of life, and the public of a citizen. A few pounds loſt may be eaſily regained; but life when loſt can never be recovered. If theſe pounds, indeed, be the whole of a man's property; if they include his clothes, his food, and the houſe where he ſhelters his head—there cannot be a doubt but that, rather than part with them, he may lawfully kill the aggreſſor, for no man can exiſt without ſhelter, food, and raiment. But it is ſeldom that an attempt is made, or is indeed practicable, to rob a man at once of all that he poſſeſſes. The queſtion then of any importance is, May a man put a robber to death rather than part with a ſmall part of his property? Mr Paley doubts whether he could innocently do ſo in a ſtate of nature, "becauſe it cannot be contended to be for the augmentation of human happineſs, that one man ſhould loſe his life or limb, rather than another a pennyworth of his property." He allows, that in civil ſociety the life of the aggreſſor may be always taken away by the perſon aggrieved, or meant to be aggrieved, when the crime attempted is ſuch as would ſubject its perpetrator to death by the laws of his country. Self.

It is not often that we feel ourſelves diſpoſed to differ in opinion from this moſt valuable and intelligent writer; but on the preſent occaſion we cannot help thinking that he does not reaſon with his uſual preciſion. To us he even ſeems to loſe ſight of his own principles. No legiſlature can have a right to take away life in civil ſociety, but in ſuch caſes as individuals have the ſame right in a ſtate of nature. If therefore a man in the ſtate of nature, have not a right to protect his property by killing the aggreſſor, when it cannot be otherwiſe protected, it appears to us ſelf-evident that no legiſlature can have a right to inflict the puniſhment of death upon ſuch offences; but if the laws inflicting death upon the crime of robbery be morally evil, it is certain that an individual cannot be innocent when he prevents robbery by the death of the robber, merely becauſe he knows that the laws of his country have decreed that puniſhment againſt thoſe convicted of that crime. But we think that the protection of property by the death of the aggreſſor may be completely vindicated upon more general principles. It is neceſſary, in every ſtate, that property be protected, or mankind could not ſubſiſt; but in a ſtate of nature every man muſt be the defender of his own property, which in that ſtate muſt neceſſarily be ſmall: and if he be not allowed to defend it by every mean in his power, he will not long be able to protect it at all. By giving him ſuch liberty, a few individuals may, indeed, occaſionally loſe their lives and limbs for the preſervation of a very ſmall portion of private property; but we believe that the ſum of human happineſs will be more augmented by cutting off ſuch worthleſs wretches than by expoſing property to perpetual depredation; and therefore, if general utility be the criterion of moral good, we muſt be of opinion that a man may in every caſe lawfully kill a robber rather than comply with his unjuſt demand.

But if a man may without guilt preſerve his property by the death of the aggreſſor, when it cannot be preſerved by any other means, much more may a woman have recourſe to the laſt extremity to protect her chaſtity from forcible violation. This, indeed, is admitted by Mr Paley himſelf, and will be controverted by no man who reflects on the importance of the female character, and the probable conſequences of the ſmalleſt deviation from the eſtabliſhed laws of female honour. See SEDUCTION.

SELF-Knowledge, the knowledge of one's own character, abilities, opinions, virtues, and vices. This has always been conſidered as a difficult though important acquiſition. It is difficult, becauſe it is diſagreeable to inveſtigate our errors, our faults, and vices; becauſe we are apt to be partial to ourſelves, even when we have done wrong; and becauſe time and habitual attention

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Self. are requiſite to enable us to diſcover our real character. But theſe difficulties are more than counterbalanced by the advantages of ſelf-knowledge.

By knowing the extent of our abilities, we ſhall never raſhly engage in enterpriſes where our ineffectual exertions may be productive of harm: by inveſtigating our opinions, we may diſcover thoſe which have no foundation, and thoſe alſo which lead us inſenſibly into vice. By examining our virtues and vices, we ſhall learn what principles ought to be ſtrengthened, and what habits ought to be removed.

Man is a rational and intelligent being, capable of great improvement, and liable to great vices. If he act without examining his principles, he may be hurried by blind paſſion into crimes. If he aſpire at noble and valuable acquiſitions, he muſt act upon a plan, with deliberation and fore thought; for he is not like a vegetable, which attains perfection by the influence of external cauſes: he has powers within himſelf which muſt be exerted, and exerted with judgement, in order to attain the perfection of his nature. To enable him to employ theſe powers aright, he muſt know, firſt, what is his duty; and, ſecondly, he muſt often review his principles and conduct, that he may diſcover whether he is performing his duty, or in what circumſtances he has failed. When he finds that he has fallen into error and vice, he will naturally inquire what cauſes have produced this effect, that he may avoid the ſame for the time to come. This is the method by which every reformation in religion and ſcience has been produced, and the method by which the arts have been improved. Before Lord Bacon introduced the new way of philoſophizing, he muſt firſt have conſidered wherein true philoſophy conſiſted; ſecondly, he muſt have inquired in what reſpects the ancient method of philoſophizing was falſe or uſeleſs: and after determining theſe two points, he was qualified to deſcribe the way by which the ſtudy of philoſophy could be ſucceſsfully purſued without deviating into hypotheſis and error. Luther found out the errors of the church of Rome by comparing their doctrines with the Scriptures. But had this compariſon never been made, the reformation could never have taken place. Without ſelf-knowledge, or without that knowledge of our character which is derived from a compariſon of our principles and conduct with a perfect ſtandard of morality, we can never form plans and reſolutions, or make any exertion to abandon the vicious habits which we have contracted, and ſtrengthen thoſe virtuous principles in which we are deficient.

As much may be learned from the errors of thoſe who have been in ſimilar ſituations with ourſelves; ſo many uſeful cautions may be obtained from our own errors; and he that will remember theſe, will ſeldom be twice guilty of the ſame vice.

It was evidently the intention of Providence that man ſhould be guided chiefly by experience. It is by the obſervations which we make on what we ſee paſſing around us, or from what we ſuffer in our own perſon, that we form maxims for the conduct of life. The more minutely therefore we attend to our principles, and the more maxims we form, we ſhall be the better fitted to attain moral perfection.

With reſpect to our underſtanding, to mark the errors which we have fallen into, either by its natural defects or by negligence, is alſo of great importance; for the greateſt genius and moſt profound ſcholar are liable to theſe errors, and often commit them as well as the weak and illiterate. But by obſerving them, and tracing them to their cauſes, they at length acquire an habitual accuracy. It is true, that men of feeble minds can never by knowing their own defects exalt themſelves to the rank of genius; but ſuch knowledge will enable them to improve their underſtandings, and ſo to appreciate their own powers, as ſeldom to attempt what is beyond their ſtrength. They may thus become uſeful members of ſociety; and though they will not probably be admired for their abilities, they will yet eſcape the ridicule which is poured upon vanity. Self.

It is difficult to lay down preciſe rules for the acquiſition of this ſelf-knowledge, becauſe almoſt every man is blinded by a fallacy peculiar to himſelf. But when one has got rid of that partiality which ariſes from ſelf-love, he may eaſily form a juſt eſtimate of his moral improvements, by comparing the general courſe of his conduct with the ſtandard of his duty; and if he has any doubt of the extent of his intellectual attainments, he will moſt readily diſcover the truth by comparing them with the attainments of others who have been moſt ſucceſsful in the ſame purſuits. Should vanity ariſe in his mind from ſuch a compariſon, let him then compare the extent of his knowledge with what is yet to be known, and he will then be in little danger of thinking of himſelf more highly than he ought to think. See PREJUDICE and *SELF-Partiality*.

SELF-Love, is that inſtinctive principle which impels every animal, rational and irrational, to preſerve its life and promote its own happineſs. It is very generally confounded with ſelfiſhneſs; but we think that the one propenſity is diſtinct from the other. Every man loves himſelf; but every man is not ſelfiſh. The ſelfiſh man graſps at all *immediate* advantages, regardleſs of the conſequences which his conduct may have upon his neighbour. Self-love only prompts him who is actuated by it to procure to himſelf the greateſt poſſible ſum of happineſs during the whole of his exiſtence. In this purſuit the rational ſelf-lover will often forego a preſent enjoyment to obtain a greater and more permanent one in reverſion; and he will as often ſubmit to a preſent pain to avoid a greater hereafter. Self-love, as diſtinguiſhed from ſelfiſhneſs, always comprehends the whole of a man's exiſtence, and in that extended ſenſe of the phraſe, we heſitate not to ſay that every man is a ſelf-lover; for, with eternity in his view, it is ſurely not poſſible for the moſt diſintereſted of the human race not to prefer himſelf to all other men, if their future and everlaſting intereſts could come into competition. This indeed they never can do; for though the introduction of evil into the world, and the different ranks which it makes neceſſary in ſociety, put it in the power of a man to raiſe himſelf, in the preſent ſtate, by the depreſſion of his neighbour, or by the practice of injuſtice, yet in the purſuit of a prize which is to be gained only by ſoberneſs, righteouſneſs, and piety, there can be no rivalſhip among the different competitors. The ſucceſs of one is no injury to another; and therefore, in this ſenſe of the phraſe, ſelf-love is not only lawful, but abſolutely unavoidable. It has been a queſtion in morals, whether it be not likewiſe the incentive to every action, however, virtuous or apparently diſintereſted?

Self. Thoſe who maintain the affirmative ſide of this queſtion ſay, that the proſpect of immediate pleaſure, or the dread of immediate pain, is the only apparent motive to action in the minds of infants, and indeed of all who look not before them, and infer the future from the paſt. They own, that when a boy has had ſome experience, and is capable of making compariſons, he will often decline an immediate enjoyment which he has formerly found productive of future evil more than equivalent to all its good; but in doing ſo they think, and they think juſtly, that he is ſtill actuated by the principle of ſelf-love, purſuing the greateſt good of which he knows himſelf to be capable. After experiencing that truth, equity, and benevolence in all his dealings is the readieſt, and indeed the only certain method of ſecuring to himſelf the kindneſs and good offices of his fellow creatures, and much more when he has learned that they will recommend him to the Supreme Being, upon whom depends his exiſtence and all his enjoyments, they admit that he will practice truth, equity, and benevolence; but ſtill, from the ſame principle, purſuing his own ultimate happineſs as the object which he has always in view. The proſpect of this great object will make him feel an exquiſite pleaſure in the performance of the actions which he conceives as neceſſary to its attainment, till at laſt, without attending in each inſtance to their conſequences, he will, by the great aſſociating principle which has been explained elſewhere (ſee METAPHYSICS, Part I. chap. i.) feel a refined enjoyment in the actions themſelves, and perform them, as occaſions offer, without deliberation or reflection. Such, they think, is the origin of benevolence itſelf, and indeed of every virtue.

Thoſe who take the other ſide of the queſtion, can hardly deny that ſelf-love thus modified may prompt to virtuous and apparently diſintereſted conduct; but they think it degrading the dignity of a man to ſuppoſe him actuated ſolely by motives which can be traced back to a deſire of his own happineſs. They obſerve, that the Author of our nature has not left the preſervation of the individual, or the continuance of the ſpecies, to the deductions of our reaſon, computing the ſum of happineſs which the actions neceſſary to theſe ends produce to ourſelves: on the contrary, He has taken care of both, by the ſurer impulſe of inſtinct planted in us for theſe very purpoſes. And is it conceivable, ſay they, that He would leave the care of our fellow-creatures a matter of indifference, till each man ſhould be able to diſcover or be taught that by loving his neighbour, and doing him all the good in his power, he would be moſt effectually promoting his own happineſs? It is diſhonouring virtue, they continue, to make it proceed in any inſtance from a proſpect of happineſs, or a dread of miſery; and they appeal from theory to fact, as exhibited in the conduct of ſavage tribes, who deliberate little on the conſequences of their actions.

Their antagoniſts reply, that the conduct of ſavage tribes is to be conſidered as that of children in civilized nations, regulated entirely by the examples which they have before them; that their actions cannot be the offſpring of innate inſtincts, otherwiſe ſavage virtues would, under ſimilar circumſtances, everywhere be the ſame, which is contrary to fact; that virtue proceeds from an intereſted motive on either ſuppoſition; and that the motive which the inſtinctive ſcheme holds up is the moſt ſelfiſh of the two. The other theory ſuppoſes, that the governing motive is the hope of *future* happineſs and the dread of *future* miſery; the inſtinctive ſcheme ſupplies a *preſent* motive in the ſelf-complacency ariſing in the heart from a conſciouſneſs of right conduct. The former is a rational motive, the latter has nothing more to do with reaſon than the enjoyment ariſing from eating or drinking, or from the intercourſe between the ſexes. But we mean not to purſue the ſubject farther, as we have ſaid enough on it in the articles BENEVOLENCE, INSTINCT, PASSION, and PHILANTHROPY. We ſhall therefore conclude with obſerving, that there is certainly a virtuous as well as a vicious ſelf-love, and that "true ſelf-love and ſocial are the ſame." Self.

SELF-Murder. See SUICIDE.

SELF-Partiality, is a phraſe employed by ſome philoſophers * to expreſs that weakneſs of human nature through which men overvalue themſelves when compared with others. It is diſtinguiſhed from general partiality, by thoſe who make uſe of the expreſſion, becauſe it is thought that a man is led to overrate his own accompliſhments, either by a particular inſtinct, or by a proceſs of intellect different from that by which he overrates the accompliſhments of his friends or children. The former kind of partiality is wholly ſelfiſh; the latter partakes much of benevolence.

* *See Lord Kaimes's Art of Thinking.*

This diſtinction may perhaps be deemed plauſible by thoſe who conſider the human mind as little more than a bundle of inſtincts; but it muſt appear perfectly ridiculous to ſuch as reſolve the greater part of apparent inſtincts into early and deep-rooted aſſociations of ideas. If the partialities which moſt men have to their friends, their families, and themſelves, be inſtinctive, they are certainly inſtincts of different kinds; but an inſtinctive partiality is a contradiction in terms. Partiality is founded on a compariſon between two or more objects; but genuine inſtincts form no compariſons. See INSTINCT. No man can be ſaid to be partial to the late Dr Johnſon, merely for thinking highly of his intellectual powers; nor was the doctor partial to himſelf, though he thought in this reſpect with the generality of his countrymen; but if, upon a compariſon with Milton, he was deemed the greater poet of the two, ſuch a judgement will be allowed to be partial, whether formed by himſelf or by any of his admirers. We apprehend, however, that the proceſs of its formation was the ſame in every mind by which it was held.

The origin of ſelf-partiality is not difficult to be found; and our partialities to our friends may be traced to a ſimilar ſource. By the conſtitution of our nature we are impelled to ſhun pain and to purſue pleaſure; but remorſe, the ſevereſt of all pains, is the never-failing conſequence of vicious conduct. Remorſe ariſes from the dread of that puniſhment which we believe will in a future ſtate be inflicted on vice unrepented of in this; and therefore every vicious perſon endeavours by all poſſible means to baniſh that dread from his own mind. One way of effecting this is to compare his own life with the lives of others; for he fancies that if numbers be as wicked as himſelf, the benevolent Lord of all things will not involve them in one common ruin. Hence, by magnifying to himſelf the temptations which led him aſtray, and diminiſhing the injuries which his conduct has done in the world, and by adopting a courſe diametrically the reverſe, when eſtimating the

Self, Selim.

the morality or immorality of the conduct of his neighbours, he ſoon comes to believe that he is at leaſt not more wicked than they. Thus is ſelf-partiality formed in the mind, and quickly blinds him who is under its influence ſo completely, as to hide from him the very faults which he ſees and blames in others. Hence the coward thinks himſelf only cautious, the miſer frugal. Partiality is formed in the very ſame manner to natural or acquired accompliſhments, whether mental or corporeal. Theſe always procure reſpect to him who is poſſeſſed of them; and as reſpect is accompanied with many advantages, every man wiſhes to obtain it for himſelf. If he fail in his attempts, he conſoles himſelf with the perſuaſion that it is at leaſt due to his merits, and that it is only withheld by the envy of the public. He compares the particular branch of ſcience or bodily accompliſhment in which he himſelf moſt excels, with thoſe which have conferred ſplendor on his rival; and eaſily finds that his own excellencies are of the higheſt order, and entitled to the greateſt ſhare of public eſteem. Hence the polite ſcholar deſpiſes the mathematician; the reader of Ariſtotle and Plato all the modern diſcoveries in phyſical and moral ſcience; and the mere experimentaliſt holds in the moſt ſovereign contempt a critical knowledge of the ancient languages. The pupil of the ancients denies the merits of the moderns, whilſt the mere modern allows nothing to the ancients; and thus each becomes partial to his own acquiſitions, and of courſe to himſelf, for having been at the trouble to make them.

Partiality to our friends and families is generated in the very ſame way. Whenever we acquire ſuch an affection for them as to conſider their happineſs as adding to our own (ſee PASSION), we magnify their excellencies, and diminiſh their defects, for the ſame reaſon, and by the ſame proceſs, that we magnify and diminiſh our own. All partialities, however, are prejudices, and prejudices of the worſt kind. They ought therefore to be guarded againſt with the utmoſt care, by the ſame means which we have elſewhere recommended (ſee PREJUDICE and METAPHYSICS, N° 98.); and he who is partial to his own virtue or his own knowledge, will do well to compare the former, not with the conduct of his neighbour, but with the expreſs rule of his duty; and to conſider the latter as no farther valuable than as it contributes to the ſum of human happineſs.

SELIM I. emperor of the Turks, was the ſecond ſon of Bajazet II. He made war upon his father, and though defeated in 1511, he at laſt dethroned him and took him priſoner, and immediately diſpatched him by poiſon, together with his elder brother Achmet, and his younger Korkud, an amiable and enlightened prince. Having eſtabliſhed his throne by theſe crimes, he marched againſt Campſon-Guary ſovereign of Egypt, gained a great victory at Aleppo, and ſlew their general. But though the ſultan periſhed in that battle, the Mameluks determined to oppoſe the emperor. Selim entering their country at the head of his army, defeated the Egyptians in two battles, and ordered Toumonbai, the new elected ſultan, who had fallen into his hands, to be hung on a gibbet. He then took Cairo and Alexandria, and in a ſhort time reduced all Egypt to ſubjection. Thus ended the dominion of the Mameluks in Egypt, which had continued for more than 260 years. He confirmed the ancient privileges of the Venetians in Egypt and Syria, by which they carried on their commerce with India, and formed a league with them to deſtroy the power of the Portugueſe in that country. (See INDIA, N° 37.) Selim had before this gained a great victory over the Perſians, and ſtripped them of Tauris and Keman. He was preparing to attack Chriſtendom when he was ſeized with an ulcerous ſore in the back. Thinking that the air of Adrianople would reſtore his health, he ordered himſelf to be conducted thither; but he died at Clari in Thrace on his road to that city, in the year 1520, in the very ſpot where he had poiſoned his father. He reigned eight years, and lived 54. He was a prince of great courage, ſobriety, and liberality: he was fond of hiſtory, and wrote ſome verſes. But theſe good qualities were obſcured by the moſt abominable crimes that ever diſgraced human nature; he made his way to the throne by ſhedding the blood of his father, and ſecured it by murdering his brothers and eight nephews, and every baſhaw who had been faithful to his duty.

Selim II Selkirk.

SELINUM, a genus of plants belonging to the pentandria claſs; and in the natural method ranking under the 45th order, *Umbellatæ*. See BOTANY *Index*.

SELKIRK, ALEXANDER, whoſe adventures gave riſe to a well-known hiſtorical romance, was born at Largo, in Fife-ſhire in Scotland, about the year 1676, and was bred a ſeaman. He went from England, in 1703, in the capacity of ſailing-maſter of a ſmall veſſel called the *Cinque-Ports Galley*, Charles Pickering captain, burthen about 90 tons, with 16 guns and 63 men; and in September the ſame year ſailed from Cork, in company with another ſhip of 26 guns and 120 men, called the St George, commanded by that famous navigator William Dampier, intended to cruiſe againſt the Spaniards in the South ſea. On the coaſt of Brazil, Pickering died, and was ſucceeded in his command by his lieutenant Thomas Stradling. They proceeded on their voyage round Cape Horn to the iſland of Juan Fernandes, whence they were driven by the appearance of two French ſhips of 36 guns each, and left five of Stradling's men there on ſhore, who were taken off by the French. Hence they ſailed to the coaſt of America, where Dampier and Stradling quarrelled, and ſeparated by agreement, on the 19th of May 1704. In September following, Stradling came again to the iſland of Juan Fernandes, where Selkirk and his captain had a difference, which, with the circumſtance of the ſhip's being very leaky, and in bad condition, induced him to determine on ſtaying there alone; but when his companions were about to depart, his reſolution was ſhaken, and he deſired to be taken on board again. The captain, however, refuſed to admit him, and he was obliged to remain, having nothing but his clothes, bedding, a gun, and a ſmall quantity of powder and ball; a hatchet, knife, and kettle; his books, and mathematical and nautical inſtruments. He kept up his ſpirits tolerably till he ſaw the veſſel put off, when (as he afterwards related) his heart yearned within him, and melted at parting with his comrades and all human ſociety at once.

" ——Yet believe me, Arcas,
Such is the rooted love we bear mankind,

Selkirk.

All ruffians as they were, I never heard
A found ſo diſmal as their parting oars."
Thomſon's Agamemnon.

Thus left ſole monarch of the iſland, with plenty of the neceſſaries of life, he found himſelf in a ſituation hardly ſupportable. He had fiſh, goat's fleſh, turnips and other vegetables; yet he grew dejected, languid, and melancholy, to ſuch a degree, as to be ſcarce able to refrain from doing violence to himſelf. Eighteen months paſſed before he could, by reaſoning, reading his bible, and ſtudy, he thoroughly reconciled to his condition. At length he grew happy, employing himſelf in decorating his huts, chaſing the goats, whom he equalled in ſpeed, and ſcarcely ever failed of catching. He alſo tamed young kids, laming them to prevent their becoming wild; and he kept a guard of tame cats about him, to defend him when aſleep from the rats, who were very troubleſome. When his clothes were worn out, he made others of goats ſkins, but could not ſucceed in making ſhoes, with the uſe of which, however, habit, in time, enabled him to diſpenſe. His only liquor was water. He computed that he had caught 1000 goats during his abode in the iſland; of which he had let go 500, after marking them by ſlitting their ears. Commodore Anſon's people, who were there about 30 years after, found the firſt goat which they ſhot upon landing, was thus marked, and as it appeared to be very old, concluded that it had been under the power of Selkirk. But it appears by Captain Carteret's account of his voyage in the Swallow ſloop, that other perſons practiſed this mode of marking, as he found a goat with his ears thus ſlit on the neighbouring iſland of Mas-a-fuera, where Selkirk never was. He made companions of his tame goats and cats, often dancing and ſinging with them. Though he conſtantly performed his devotions at ſtated hours, and read aloud; yet, when he was taken off the iſland, his language, from diſuſe of converſation, had become ſcarcely intelligible. In this ſolitude he continued four years and four months; during which time only two incidents happened which he thought worth relating, the occurrences of every day being in his circumſtances nearly ſimilar. The one was, that, purſuing a goat eagerly, he caught it juſt on the edge of a precipice, which was covered with buſhes, ſo that he did not perceive it, and he fell over to the bottom, where he lay (according to Captain Roger's account) 24 hours ſenſeleſs; but, as he related to Sir R. Steele, he computed, by the alteration of the moon, that he had lain three days. When he came to himſelf, he found the goat lying under him dead. It was with great difficulty that he could crawl to his habitation, whence he was unable to ſtir for ten days, and did not recover of his bruiſes for a long time. The other event was the arrival of a ſhip, which he at firſt ſuppoſed to be French: and ſuch is the natural love of ſociety in the human mind, that he was eager to abandon his ſolitary felicity, and ſurrender himſelf to them, although enemies; but upon their landing, approaching them, he found them to be Spaniards, of whom he had too great a dread to truſt himſelf in their hands. They were by this time ſo near that it required all his agility to eſcape, which he effected by climbing into a thick tree, being ſhot at ſeveral times as he ran off. Fortunately the Spaniards did not diſcover him, though they ſtayed ſome time under the tree where he was hid, and killed ſome goats juſt by. In this ſolitude Selkirk remained until the 2d of February 1709, when he ſaw two ſhips come into the bay, and knew them to be Engliſh. He immediately lighted a fire as a ſignal; and on their coming on ſhore, found they were the Duke Captain Rogers, and the Ducheſs Captain Courtney, two privateers from Briſtol. He gave them the beſt entertainment he could afford; and, as they had been a long time at ſea without freſh proviſions, the goats which he caught were highly acceptable. His habitation conſiſting of two huts, one to ſleep in, the other to dreſs his food in, was ſo obſcurely ſituated, and ſo difficult of acceſs, that only one of the ſhip's officers would accompany him to it. Dampier, who was pilot on board the Duke, and knew Selkirk very well, told Captain Rogers, that, when on board the Cinque-Ports, he was the beſt ſeaman in the veſſel; upon which Captain Rogers appointed him maſter's mate of the Duke. After a fortnight's ſtay at Juan Fernandes, the ſhips proceeded on their cruize againſt the Spaniards; plundered a town on the coaſt of Peru; took a Manilla ſhip off California; and returned by way of the Eaſt Indies to England, where they arrived the 1ſt of October 1711; Selkirk having been abſent eight years, more than half of which time he had ſpent alone in the iſland. The public curioſity being excited reſpecting him, he was induced to put his papers into the hands of Defoe, to arrange and form them into a regular narrative. Theſe papers muſt have been drawn up after he left Juan Fernandes, as he had no means of recording his tranſactions there. Captain Cooke remarks, as an extraordinary circumſtance, that he had contrived to keep an account of the days of the week and month; but this might be done, as Defoe makes Robinſon Cruſoe do, by cutting notches in a poſt, or many other methods. From this account of Selkirk, Defoe took the idea of writing a more extenſive work, the romance of Robinſon Cruſoe, and very diſhoneſtly defrauded the original proprietor of his ſhare of the profits. Of the time or place or manner of this extraordinary man's death we have received no account; but in 1798 the cheſt and muſket which Selkirk had with him on the iſland were in the poſſeſſion of his grand-nephew, John Selkirk weaver in Largo. Selkirk.

The circumſtances of Selkirk's ſecluſion from human ſociety during his ſtay on Juan Fernandes, and the ſentiments which that ſituation naturally inſpired, have been ſo finely and characteriſtically depicted by Mr Cowper, that many of our readers, we doubt not, will be gratified if we give the verſes alluded to a place here.

I am monarch of all I ſurvey,
My right there is none to diſpute;
From the centre all round to the ſea,
I am lord of the fowl and the brute.
Oh, ſolitude! where are the charms
That ſages have ſeen in thy face?
Better dwell in the midſt of alarms,
Than reign in this horrible place.
I am out of humanity's reach,
I muſt finiſh my journey alone,
Never hear the ſweet muſic of ſpeech;
I ſtart at the ſound of my own.

The

Selkirk.

The beaſts that roam over the plain,
My form with indifference ſee;
They are ſo unacquainted with man,
Their tameneſs is ſhocking to me.
Society, friendſhip, and love,
Divinely beſtow'd upon man,
Oh, had I the wings of a dove,
How ſoon would I taſte you again!
My ſorrows I then might aſſuage
In the ways of religion and truth,
Might learn from the wiſdom of age,
And be cheer'd by the ſallies of youth.
Religion! what treaſure untold
Reſides in that heavenly word!
More precious than ſilver and gold,
Or all that this earth can afford.
But the ſound of the church-going bell
Theſe valleys and rocks never heard,
Ne'er ſigh'd at the ſound of a knell,
Or ſmil'd when a ſabbath appear'd.
Ye winds that have made me your ſport,
Convey to this deſolate ſhore
Some cordial endearing report
Of a land I ſhall viſit no more.
My friends, do they now and then ſend
A wiſh or a thought after me?
O tell me I yet have a friend,
Though a friend I am never to ſee.
How fleet is a glance of the mind!
Compar'd with the ſpeed of its flight,
The tempeſt itſelf lags behind,
And the ſwift-winged arrows of light.
When I think of my own native land,
In a moment I ſeem to be there;
But alas! recollection at hand
Soon hurries me back to deſpair.
But the ſea-fowl is gone to her neſt,
The beaſt is laid down in his lair,
Ev'n here is a ſeaſon of reſt,
And I to my cabin repair.
There's mercy in every place;
And mercy, encouraging thought!
Gives even affliction a grace,
And reconciles man to his lot.

SELKIRK, the capital of the county of the ſame name, is a ſmall town pleaſantly ſituated on a riſing ground, and enjoys an extenſive proſpect in all directions, eſpecially in the courſe of the river Ettrick. It is remarkable for thoſe plaintive airs produced in its neighbourhood, the natural ſimplicity of which are the pride of Scotland and the admiration of ſtrangers.

The citizens of this burgh, like the other inhabitants of the ſheriffdom of Ettrick foreſt, rendered themſelves famous by adhering to the fortune of their ſovereign James IV. Of 100 citizens who followed that monarch to the plains of Flodden, a few returned loaded with ſpoils taken from the Engliſh. Of the trophies of that day, there yet remains in the poſſeſſion of the corporation of weavers, a ſtandard taken by a member of that body. It may alſo be mentioned, that the ſword of William Brydone, the town-clerk, who led the citizens to the battle, and was knighted for his valour, ſtill remains, it is ſaid, in the poſſeſſion of a citizen of Selkirk, his lineal deſcendent. The deſperate valour of the citizens, however, ſo exaſperated the Engliſh, that they reduced their defenceleſs town to aſhes; but their grateful ſovereign, James V. ſhewed his ſenſe of their ſervices by a grant of an extenſive track of Ettrick foreſt, the trees for building their houſes, and the property as a reward for their heroiſm. Selkirk is a royal burgh, uniting with Lanark, Linlithgow and Peebles, in ſending a member to parliament. W. Long. 2. 46. N. Lat. 55. 26.

Selkirk || Selkirk-ſhire.

SELKIRK-SHIRE, called alſo the *Sheriffdom of Ettrick Foreſt*, a county of Scotland, extending about 20 miles in length from eaſt to weſt, and about 12 in breadth from ſouth to north. It borders on the north with part of Tweeddale and Mid-Lothian; on the ſouth and eaſt with Teviotdale; and on the weſt with Annandale. This county was formerly reſerved by the Scottiſh princes for the pleaſure of the chace, and where they had houſes for the reception of their train. At that time the face of the country was covered with woods, in which there were great numbers of red and fallow deer, whence it had the name of *Ettrick Foreſt*. The woods, however, are now almoſt entirely cut down, and the county is chiefly ſupported by the breed of ſheep. They are generally ſold into the ſouth, but ſometimes into the Highlands, about the month of March, where they are kept during ſummer; and after being improved by the mountain-graſs, are returned into the Lowlands in the beginning of winter.

This county, though not very populous at preſent, was once the nurſe of heroes, who were juſtly accounted the bulwark of their native ſoil, being ever ready to brave danger and death in its defence. Of this we have a memorable proof in the pathetic lamentations of their wives and daughters for the diſaſter of the field of Flodden, "where their brave foreſters were a' wed away." The rivers Ettrick and Yarrow unite a little above the town of Selkirk, and terminate in the Tweed. For five miles above its junction with the Etterick, the Tweed is ſtill adorned with woods, and leads the pleaſed imagination to contemplate what this country muſt have been in former times. The Yarrow, for about five miles above its junction with Ettrick, exhibits nature in a bold and ſtriking aſpect. Its native woods ſtill remain, through which the ſtream has cut its turbid courſe, deeply ingulphed amidſt rugged rocks. Here, certainly in a flood, ſtood the deſcriptive Thomſon when he ſaw it

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"Work and boil, and foam and thunder through."

On a peninſula, cut out by the ſurrounding ſtream, in the middle of this fantaſtically wild ſcene of grandeur and beauty, ſtands the caſtle of Newark, which has been ſuppoſed by many to be the birthplace of Mary Scot the flower of Yarrow.

The population of this county in 1801 amounted to 5070, but the following is the population of the different pariſhes at two different periods, according to the Statiſtical Hiſtory.

Pariſhes.	Population in 1755.	Population in 1790—1798.
Ettrick,	397	470
Galaſhiels,	998	914
Carry forward,	1395	1384

Sell || Semen.

Parifhes.	Population in 1755.	Population in 1790—1798.
Brought over,	1395	1384
Selkirk,	1793	1700
Yarrow,	1180	1230
	4368	4314
	4314	
Decreafe,	54	

SELL, or SILL, in building, is of two kinds, viz. *Ground Sell*, denoting the loweft piece of timber in a wooden building, and that on which the whole fuperftructure is railed; and *fell of a window* or *of a door*, which is the bottom piece in the frame of them on which they reft.

SELLA TURCICA, is a deep impreffion between the clinoid procefs of the fphenoid bone. See ANATOMY *Index*.

SELTZER WATER, is a mineral water which fprings up at Lower Seltzer, a village in the electorate of Triers, about 10 miles from Frankfort on the Mayne, and 36 from Coblentz.

Seltzer water is brought to this country in ftone bottles, which are clofely corked and fealed, and contain about 3 pints each; and when they are well fecured, it keeps unchanged for a confiderable time.

Seltzer water, according to the analyfis of Bergman, contains in an Engliſh wine pint,

	grs.
Carbonate of lime	3
——— of magnefia	5
——— of foda	4
Muriate of foda	17.5
	29.5

The fame quantity of water alfo yields 17 cubic inches of a gafeous fubftance, which is found to be almoft entirely pure carbonic acid gas.

This water has been long in high repute, on account of its medical virtues, and we have no doubt that it may be ufed with conſiderable benefit in many of thofe complaints which arife from a deranged ftate of the ftomach and bowels. The ufual dofe of this water is from half a pint to a pint; but in moft cafes it may be drunk freely. From its agreeable taſte, and its exhilarating effects on the fpirits, it is extenfively employed at table as a common drink in Germany and Holland. In this country alfo, both the real and artificial Seltzer water is largely ufed for the fame purpofe. Seltzer water may be artificially imitated, by adding the ingredients diluted by analyfis, and in the fame proportion.

SEM, or SHEM, the fon of Noah, memorable for his filial piety in concealing the folly and difgrace of his father, for which he received a remarkable benediction, about 2476 B. C. He lived to the age of 600 years.

Ras SEM. See *RAS Sem* and *PETRIFIED City*.

SEMECARPUS, a genus of plants belonging to the pentandria claſs. See BOTANY *Index*.

SEMEN, SEED. See BOTANY *Index*.

With reſpect to number, plants are either furniſhed with one feed, as ſea-pink and biſtort; two, as woodroof and the umbelliferous plants; three, as ſpurge; four, as the lip-flowers of Tournefort and rough-leaved plants of Ray; or many, as ranunculus, anemone, and poppy. Semen.

The form of ſeeds is likewiſe extremely various, being either large or ſmall, round, oval, heart-ſhaped, kidney-ſhaped, angular, prickly, rough, hairy, wrinkled, ſleek or ſhining, black, white, or brown. Moſt ſeeds have only one cell or internal cavity; thoſe of leſſer burdock, valerian, lamb's lettuce, cornelian, cherry, and ſebeſten, have two.

With reſpect to ſubſtance, ſeeds are either ſoft, membranaceous, or of a hard bony ſubſtance; as in gromwell, tamarind, and all the nuciferous plants.

In point of magnitude, ſeeds are either very large, as in the cocoa-nut; or very ſmall, as in campanula, *ammannia*, rampions, and throat-wort.

With reſpect to ſituation, they are either diſperſed promiſcuouſly through the pulp (*ſemina nidulantia*), as in water-lily; affixed to a ſuture or joining of the valves of the ſeed-veſſel, as in the croſs-ſhaped and pea-bloom flowers; or placed upon a *placenta* or receptacle within the ſeed veſſel, as in tobacco and thorn-apple.

Seeds are ſaid to be naked (*ſemina nuda*) which are not contained in a cover or veſſel: ſuch are thoſe of the lip and compound flowers, the umbelliferous and rough-leaved plants. Covered ſeeds (*ſemina tecta*) are contained in ſome veſſel, whether of the capſule, pod, berry, apple, or cherry kind.

A ſimple ſeed is ſuch as bears neither crown, wing, nor downy *pappus;* the varieties in ſeeds, ariſing from theſe circumſtances, are particularly enumerated under their reſpective heads.

In aſſimilating the animal and vegetable kingdoms, Linnæus denominates ſeeds the eggs of plants. The fecundity of plants is frequently marvellous; from a ſingle plant or ſtalk of Indian Turkey wheat, are produced, in one ſummer, 2000 ſeeds; of elecampane, 3000; of ſun-flower, 4000; of poppy, 32,000; of a ſpike of cat's tail, 10,000 and upwards: a ſingle fruit, or ſeed-veſſel, of tobacco, contains 1000 ſeeds; that of white poppy, 8000. Mr Ray relates, from experiments made by himſelf, that 1012 tobacco ſeeds are equal in weight to one grain; and that the weight of the whole quantum of ſeeds in a ſingle tobacco plant, is ſuch as muſt, according to the above proportion, determine their number to be 360,000. The ſame author eſtimates the annual produce of a ſingle ſtalk of ſpleenwort to be upwards of one million of ſeeds.

The diſſemination of plants reſpects the different methods or vehicles by which nature has contrived to diſperſe their ſeeds for the purpoſe of increaſe. Theſe by naturaliſts are generally reckoned four.

1. Rivers and running waters. 2. The wind. 3. Animals. 4. An elaſtic ſpring, peculiar to the ſeeds themſelves.

1. The ſeeds which are carried along by rivers and torrents are frequently conveyed many hundreds of leagues from their native ſoil, and caſt upon a very different climate, to which, however, by degrees they render themſelves familiar.

2. Thoſe which are carried by the wind, are either *winged*, as in fir-tree, trumpet-flower, tulip-tree, birch, arbor-vitæ, meadow rue, and jeſſamine, and ſome umbelliferous plants; furniſhed with a *pappus*, or downy crown, as in valerian, poplar, reed, ſucculent-ſwallow-wort, cotton-tree, and many of the compound flowers; placed

Semen || Semi.

placed within a winged *calyx* or ſeed-veſſel, as in ſcabious, ſea-pink, dock, dioſcorea, aſh, maple, and elm-trees, logwood and woad; or laſtly, contained within a ſwelled *calyx* or ſeed veſſel, as in winter cherry, cucubalus, melilot, bladder-nut, fumatory, bladder-ſena, heart-ſeed, and chick-peaſe.

3. Many birds ſwallow the ſeeds of vanelloe, juniper, miſſletoe, oats, millet, and other graſſes, and void them entire. Squirrels, rats, parrots, and other animals, ſuffer many of the ſeeds which they devour to eſcape, and thus in effect diſſeminate them. Moles, ants, earthworms, and other inſects, by ploughing up the earth, admit a free paſſage to thoſe ſeeds which have been ſcattered upon its ſurface. Again, ſome ſeeds attach themſelves to animals, by means of crotchets, hooks, or hairs, which are either affixed to the ſeeds themſelves, as in hound's tongue, mouſe-ear, vervain, carrot, baſtard-parſley, ſanicle, water hemp-agrimony, *arctopus* and *verbeſina*; to their calyx, as in burdock, agrimony, *rhexia*, ſmall wild bugloſs, dock, nettle, pellitory, and ſeed-wort, or to their fruit or ſeed-veſſel, as in liquorice, enchanter's nightſhade, croſs-wort, cleavers, French honeyſuckle, and arrow-headed graſs.

4. The ſeeds which diſperſe themſelves by an elaſtic force, have that force reſident either in their *calyx*, as in oats, and the greater number of ferns; in their *pappus*, as in centaurea crupina; or in their *capſule*, as in gerannium, herb-bennet, African ſpiræa, fraxinella, horſe-tail, balſam, Malabar nut, cucumber, elaterium, and male balſam apple.

SEMEN, in the animal economy. See PHYSIOLOGY and ANATOMY *Index*.

SEMEN Sanctum, or *Santonicum*. See ARTEMISIA.

SEMENDRIAH, a town of Turkey in Europe, in the province of Servia, with a good citadel. It is the capital of a ſangiacate, was taken by the Turks in 1690, and is ſeated on the Danube, in E. Long. 21. 45. N. Lat. 45. 0.

SEMENTINÆ FERIÆ, in antiquity, feaſts held annually among the Romans, to obtain of the gods a plentiful harveſt. They were celebrated in the temple of Tellus, where ſolemn ſacrifices were offered to Tellus and Ceres. Theſe feaſts were held about ſeed-time, uſually in the month of January; for, as Macrobius obſerves, they were moveable feaſts.

SEMI, a word borrowed from the Latin, ſignifying *half*; but only uſed in compoſition with other words, as in the following articles.

SEMI-Arians, in eccleſiaſtical hiſtory, a branch of the ancient Arians, conſiſting, according to Epiphanius, of ſuch as, in appearance, condemned the errors of that hereſiarch, but yet acquieſced in ſome of the principles thereof, only palliating and hiding them under ſofter and more moderate terms. Though they ſeparated from the Arian faction (ſee ARIANS), they could never be brought to acknowledge that the Son was homoouſios, that is, conſubſtantial, or of the ſame ſubſtance with the Father; they would only allow him to be homoouſios, that is, of a like ſubſtance with the Father, or ſimilar to the Father in his eſſence, not by nature, but by a peculiar privilege.

The ſemi-arianiſm of the moderns conſiſts in their maintaining that the Son was from all eternity begotten by the *will* of the Father, contrary to the doctrine of the orthodox, who ſeem to teach that the eternal generation is *neceſſary*. Such at leaſt are the reſpective opinions of Dr Clarke and Biſhop Bull. See THEOLOGY.

Semi || Semirary.

SEMICIRCLE, in *Geometry*, half a circle, or that figure comprehended between the diameter of the circle and half its circumference.

SEMICOLON, in *Grammar*, one of the points or ſtops uſed to diſtinguiſh the ſeveral members of a ſentence from each other.

The mark or character of the ſemicolon is (;), and has its name as being of ſomewhat leſs effect than a colon; or as demanding a ſhorter pauſe.

The proper uſe of the ſemicolon is to diſtinguiſh the conjunct members of a ſentence. Now, by a conjunct member of a ſentence is meant ſuch a one as contains at leaſt two ſimple members.—Whenever, then, a ſentence can be divided into ſeveral members of the ſame degree, which are again diviſible into other ſimple members, the former are to be ſeparated by a ſemicolon. For inſtance: "If fortune bear a great ſway over him, who has nicely ſtated and concerted every circumſtance of an affair; we muſt not commit every thing, without reſerve, to fortune, leſt ſhe have too great a hold of us." Again: *Si quantum in agro lociſque deſertis audacia poteſt, tantum in foro atque judiciis impudentia valeret; non minus in cauſa cederet Aulus Cæcinna Sexta Æbutii impudentiæ, quam tum in vi facienda ceſſit audaciæ.* An inſtance in a more complex ſentence we have in Cicero: *Res familiaris primum bene parta ſit, nulloque turpi quæſtu: tum quam plurimis, modo dignis, ſe utilem præbeat; deinde augeatur ratione, diligentia, parſimonia; nec libidini potius luxuriæque, quam liberalitati et beneficentiæ pareat.*

But though the proper uſe of the ſemicolon be to diſtinguiſh conjunct members, it is not neceſſary that all the members thus divided be conjunct. For upon dividing a ſentence into great and equal parts, if one of them be conjunct, all thoſe other parts of the ſame degree are to be diſtinguiſhed by a ſemicolon.—Sometimes alſo it happens, that members that are oppoſite to each other, but relate to the ſame verb, are ſeparated by a ſemicolon. Thus Cicero: *Ex hac parte pudor, illinc petulantia; hinc fides, illinc fraudatio; hinc pietas, illinc ſcelus*, &c. To this likewiſe may be referred ſuch ſentences, where the whole going before, the parts follow: as "The parts of oratory are four; invention, diſpoſition, elocution, and pronunciation."

SEMICUBIUM, in *Medicine*, an half-bath, wherein the patient is only placed up to the navel.

SEMIDIAMETER, half the diameter, or a right line drawn from the centre of a circle or ſphere to its circumference: being the ſame with what is otherwiſe called the *radius*.

SEMIFLOSCULUS, in *Botany*, a term uſed to expreſs the flowers of the ſyngeneſia claſs. Theſe ſemifloſculi are petals, hollow in their lower part, but in their upper flat, and continued in the ſhape of a tongue.

SEMITONE, in *Muſic*. See INTERVAL.

SEMINAL, ſomething belonging to the ſemen or ſeed.

SEMINARY, in its primary ſenſe, the ground where any thing is ſown, to be afterwards tranſplanted.

SEMINARY, in a figurative ſenſe, is frequently applied to places of education, whence ſcholars are tranſplanted

Semination ‖ Semipelagians.

planted into life.—In Catholic countries it is particularly uſed for a kind of college or ſchool, where youth are inſtructed in the ceremonies, &c. of the ſacred miniſtry. Of theſe there are great numbers; it being ordained by the council of Trent, that there be a ſeminary belonging to each cathedral, under the direction of the biſhop.

SEMINATION, denotes the manner or act of ſhedding and diſperſing the ſeeds of plants. See SEMEN.

SEMIPELAGIANS, in *Eccleſiaſtical Hiſtory*, a name given to ſuch as retain ſome tincture of Pelagianiſm. See PELAGIANS.

The doctrines of this ſect, as well as thoſe of their predeceſſors the Pelagians, have their common ſource in Pelagius, a native of Britain, of whom we have already taken notice. He is ſaid to have been but a ſimple monk, and not in orders. Having gone to Rome about the end of the fourth century, he lived there for ſome years with reputation, and was conſidered both pious and virtuous. Rufinus a prieſt of Aquileia, having come to Rome in the year 397, is affirmed by ſome to have been the perſon who ſuggeſted to Pelagius his peculiar doctrines.

In the year 400 Pelagius began to teach his opinions at Rome, both by ſpeech and writing. He was not the only perſon who taught theſe doctrines, of which we have elſewhere enumerated the heads. His friend and companion Celeſtius, an abler man than himſelf, maintained them likewiſe, and with much more addreſs and ſubtlety. After having promulgated them in Rome, they went into Sicily, where they lived for ſome time. Thence, in the year 411, they paſſed over into Africa. Pelagius ſoon after went into Paleſtine, whilſt Celeſtius remained at Carthage, and was preparing himſelf to take the order of prieſthood; but it being ſoon diſcovered that he taught a new doctrine *, he was accuſed by the deacon Paulinus in a ſynod held at Carthage in 412, at which Aurelius the biſhop preſided. Celeſtius, on being charged by Paulinus with denying original ſin, made anſwer, "That in truth he doubted whether the ſin of Adam was tranſmitted to his poſterity." He did not however own that children had no need of baptiſm, although this was one of the Pelagian tenets: on the contrary, he wrote a little diſcourſe, in which he acknowledged, that children had need of redemption, and that they could not obtain it without baptiſm. The biſhops at the council of Carthage condemned the doctrines of Celeſtius, and excommunicated him. From this ſentence he appealed to the biſhop of Rome; but he neglected to purſue his appeal, and went to Epheſus, where he endeavoured to get himſelf ordained prieſt. In the mean time, Pelagius having retired into Paleſtine, was kindly received by St Jerome's enemy, John of Jeruſalem. With him he entered into an engagement to attack the reputation of that author. St Jerome defended himſelf from their aſſault, and attacked the doctrines of Pelagius †, and in this undertaking he was ſoon aſſiſted by St Auſtine. About this time, Oroſius having gone from Spain into Africa and thence into Paleſtine, publiſhed there the proceedings againſt Celeſtius at Carthage, and was prevailed upon by the biſhop of Jeruſalem to enter into a conference with Pelagius in his preſence; but the biſhop having ſhown too much partiality for Pelagius, Oroſius would not acknowledge him for judge, but demanded that the deciſion of that affair, which was among the Latins, might be referred to judges who underſtood the language. This happened in the year 415, at which time there were in Paleſtine two French prelates, who, being driven from their dioceſes, fled into that country, and having been apprized of the opinions of Pelagius and Celeſtius, drew up an abridgement from their own books of the errors imputed to them ‡. To this they joined the articles condemned in the ſynod of Carthage, and ſome others, which were ſent from Sicily by Hilarius to St Auguſtine, and then preſented the abridgement to the biſhop of Cæſarea. The matter was referred to a council of 14 biſhops, at which, when the memoir was read, Pelagius explained himſelf upon ſome articles, and denied that he was the author of others. He alſo diſowned the propoſitions condemned at Carthage, and ſome others aſcribed to Celeſtius. He did not even heſitate to condemn them; upon which the biſhops decided, that, ſince Pelagius approved the doctrine of the church, and rejected and condemned what was contrary to its belief, they acknowledged him to be of the eccleſiaſtical and catholic communion.

Semipelagians.

Oroſius returning to Africa, took with him the memoir againſt Pelagius, and preſented it to a meeting of biſhops * held at Carthage in 416. Having read over what had been done at a former meeting againſt Celeſtius, they declared, that both he and Pelagius ought to be anathematized if they did not publicly renounce and condemn the errors imputed to them. The biſhops of this meeting, and thoſe of Numidia aſſembled the ſame year at Milivetum, wrote upon the ſubject to Pope Innocent, who approved of the judgement of the African prelates, and declared Pelagius, Celeſtius, and their followers excommunicated †. Innocent gave an account of this judgement to the biſhops of the Eaſt, and the matter ſeemed altogether at an end, when he died; but Celeſtius having been made prieſt at Epheſus, and having gone to Conſtantinople, whence he was driven by Atticus biſhop of that city, who alſo wrote againſt him to Aſia and to Africa, he came to Rome in the beginning of the pontificate of Zozimus, and undertook to purſue the appeal, which he had formerly made from the judgement of the ſynod of Carthage. Having cited his accuſer Paulinus, and offered to juſtify himſelf, he preſented a Confeſſion of Faith, in which he acknowledged that children ought to be baptized, in order to inherit the kingdom of heaven; but he denied that the ſin of Adam was tranſmitted to his children. He appeared before the biſhops and clergymen aſſembled by the pope, and declared, that he condemned all the errors with which he had been charged. The pope delayed his judgement for two months, and in the mean time received a letter and a confeſſion of faith from Pelagius, very artfully drawn up. When the time for judgement arrived, Zozimus held a ſynod, and ſaid, that he thought the declarations of Pelagius and Celeſtius ſufficient for their juſtification. He was diſpleaſed at the two French biſhops for not appearing againſt them, and wrote two letters on that head, one to the biſhops of Africa, and another in particular to Aurelius, biſhop of Carthage. The African biſhops, to the number of 214, without regarding the judgement paſſed at Rome, aſſembled at Carthage, and, having confirmed their former deciſions, condemned the doctrines of the Pelagians. They wrote

* *Auguſtini*, lib. ii. *De Gratia.*

† *St Jerome's Works and the Apology of Oroſius.*

‡ *St Auſtine on Original Sin, and againſt the Pelagians.*

* *The Epiſtles of St Auguſtine.*

† *Marius Mercator's Commentary.*

to

Semipelagians. to the biſhop of Reme to acquaint him, that he had been deceived by Celeſtius, and diſcovered to him the equivocations of his letter and of the Confeſſion of Faith of Pelagius, ſending him a memoir of the errors of which he ſhould require a diſtinct and preciſe revocation from the two heretics. The pope made anſwer, that, although his authority was ſo great, that none durſt diſſent from his judgement, ſtill that he was willing to communicate the matter to them, and would let it remain in the ſame ſtate, until a new deliberation could take place. This letter was preſented to a council held at Carthage in 418, at which eight canons were drawn up againſt the Pelagian hereſy. The biſhop of Rome, in the mean time, was inclined to examine again the affair of Celeſtius, and to endeavour to draw from him diſtinct and preciſe anſwers according to the plan ſuggeſted by the African biſhops in their memoir; but Celeſtius would not come forward, and accordingly withdrew from Rome. From his flight the pope concluded, that he impoſed upon him formerly, and that he held the new doctrines; and, accordingly, changing his opinion with reſpect to him, he approved of the decrees of the African prelates, and renewed the condemnations of his predeceſſor, Pope Innocent, againſt him and Pelagius *. This judgement he publiſhed in a letter which was ſent to all the biſhops. About the ſame time an edict was publiſhed by the emperor Honorius againſt Pelagius and Celeſtius, ordering, that they ſhould be baniſhed from Rome, and that all their followers ſhould be ſent into exile.

* See *the Letters of St Auguſtine.*

In the following year Honorius publiſhed another edict, by which it was ordered, that the biſhops who would not ſign the pope's letter, ſhould be deprived of their churches. Accordingly, Julian the biſhop of Eclana, who was afterwards head of the party, and ſeventeen other biſhops, were caſhiered; upon which they wrote a letter to Rufus, biſhop of Theſſalonica, and demanded a univerſal council from the emperor, which he refuſed. Celeſtius returned again to Rome, but was again expelled the city; whilſt his followers, being expelled from Italy, retired to different countries. Some of them came over into Britain, and others went into the Eaſt. Atticus baniſhed them from Conſtantinople, and they were alſo baniſhed from Epheſus. Theodotus, biſhop of Antioch, condemned them in a ſynod held at Dioſpolis, and baniſhed Pelagius and his followers out of Paleſtine, whither they had returned. Julian the biſhop was condemned in a provincial ſynod of Cilicia, whither he had retired to Theodorus biſhop of Mopſueſta, who was obliged to anathematize him. What became of Pelagius is unknown, as hiſtory gives no farther account of him; but Celeſtius having returned to Rome, and being driven thence by Pope Celeſtin, went with Julian and ſome other biſhops of their party to Conſtantinople, where they endeavoured to prevail upon the emperor Theodoſius to aſſemble a council, inſtead of which he ordered them to leave the city. After this they joined with the Neſtorians †, and were condemned together with them in a general council held at Epheſus in 431; and there now remained but a ſmall number of Pelagians diſperſed in the Weſt. Julian after having endeavoured ſeveral times to get himſelf reinſtated in his biſhopric, was at laſt obliged to retire into Sicily, where he died.

† *Proſper in his Chronicle.*

To the Pelagians ſucceeded the Semipelagians, who rejected the doctrines of the former with reſpect to original ſin and the power of free will to do good ‡. They owned, that man had need of the grace of God to perſevere in well-doing; but they believed, that the beginning of good will and faith did not neceſſarily depend upon grace; for that man, by the mere force of nature, might deſire to do good, and that God ſeconded that good will by his aſſiſtance, which depended upon liberty, and was given to all men. Beſides theſe, they maintained ſome other peculiar tenets. The origin of ſome of their opinions is founded in this, that ſome of the books which were written by St Auguſtine in his laſt years, with reſpect to the controverſies which aroſe in the monaſtery of Adrumetum, relative to correction, grace, and predeſtination, having been carried into Gaul, happened to give offence to ſeveral perſons, and particularly to the monks of Lerins, who conſidered his doctrines hoſtile to that of free will. This led them to think and to maintain, that, in order to be ſaved, it was neceſſary to leave to man the power of knowing and deſiring good by the force of nature, ſo that the beginning might come from man. Several conſiderable perſons in Gaul, and even ſome biſhops, but particularly the prieſts, were of this opinion. Caſſian, deacon of Conſtantinople, and afterwards prieſt at Marſeilles, authorized it in his conferences, and Fauſtus, biſhop of Riez, ſupported it very ſtrenuouſly. St Auguſtine ſtood up to oppoſe this doctrine from its very firſt appearance, and was ſupported by Proſper and Hilarius. Pope Celeſtin complained to the biſhops of Gaul, that they ſuffered their prieſts to ſpeak ill of the doctrines of St Auguſtine; and Popes Gelaſius and Hormiſdas condemned the books of Fauſtus; and laſt of all, the council of Orange, held in 529, condemned particularly the principal tenets of the Semipelagians, and put an end at that time to the controverſy, about 100 years after the death of St Auguſtine.—See the hiſtories of Moſheim, Dupin and Fleury, &c. &c.

Semipelagians. ‡ *Hilary's Letters to Auguſtine.*

The Semipelagians were very numerous; and their doctrines, though variouſly explained, were received in many of the monaſtic ſchools in Gaul, whence they ſpread themſelves far and wide through Europe. With reſpect to the Greeks and other Chriſtians of the Eaſt, we may remark, that they had adopted the Semipelagian tenets, even before they were promulgated in Gaul by Caſſian and Fauſtus.

After the period, however, at which the Semipelagian doctrines were condemned in the council of Orange, we find but little notice taken of this ſect by hiſtorians. Although its tenets were maintained by a few in the ſucceeding centuries, the ſect could boaſt of no eminent leaders, and ſunk into obſcurity. In the beginning, indeed, of the reformation, ſome of the Pelagian tenets were again brought into circulation. Every one is acquainted with the hoſtility of Luther to the doctrine of free will, who went ſo far into the oppoſite extreme as to entitle one of his works againſt the celebrated Eraſmus on this ſubject, "*De Servo Arbitrio.*" But notwithſtanding that Luther was their leader, this doctrine of his was not adopted by ſome of the moſt eminent of the reformers. His learned friend, the mild and worthy Melancthon, although he at firſt (either from not having ſufficiently conſidered the ſubject, or becauſe this doctrine was ſo unpalatable to the great body of the reformers on account of the authority of Luther), joined

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with Luther in his hoſtility to the doctrine of free will, ſo far as to ſay, that free will could have no effect, under the influence of grace, ſhortly after changed his opinion ſo as to run into the oppoſite extreme. For although Luther at his outſet had affirmed, that the preſcience of God annihilated free will in all his creatures, he was ſo ſoftened down into moderation at the time of the drawing up of the famous Confeſſion of Augſburg, as to allow Melancthon, who compoſed it, to inſert theſe words, "that it was neceſſary to allow free-will to all who poſſeſſed the uſe of reaſon, not however in ſuch things as regarded God, which they could not commence, *or at leaſt which they could not complete*, without his aſſiſtance and grace, but in the affairs, or works, of the preſent life ſolely, and in order to perform their duty towards ſociety *." In this paſſage two truths are clearly admitted: 1. That there is free-will in man; and 2. That of itſelf it has no efficacy in ſuch works as are purely Chriſtian or religious. But although this be evident, and although it would ſeem as if he attributed the efficacy of religious works ſolely to the grace of God, yet the reſtricting words "*at leaſt*," ſhow, that he was of opinion, that free-will, by its own natural force and efficacy, though it could not complete, *could at leaſt commence*, Chriſtian or religious works, without the aſſiſtance of grace. To ſuch of our readers as are acquainted with eccleſiaſtical hiſtory, it is unneceſſary to remark, that this was one of the leading tenets of the Semipelagians. But Melancthon did not ſtop here. It is true, that, in order to keep well with the reformers, he was obliged, in thoſe public inſtruments which he drew up, to inſinuate rather than avow his partiality for the doctrine of free-will, the exerciſe of which, we ſee, he confined in the Confeſſion of Augſburg to ſuch actions merely as regarded civil life and our duties to ſociety. In the Saxon Confeſſion of Faith, however, he proceeds a ſtep farther, and ſays "that the will is free; that God neither wiſhes for, nor approves, nor co-operates in the production of ſin; but that the free-will of man and of the devils is the true cauſe of their ſin and of their fall." Many no doubt will be of opinion, that Melancthon merits praiſe for having thus corrected Luther, and for having more clearly expreſſed his own opinion, than he had done in the Confeſſion of Augſburg. He even proceeds farther, and extends the exerciſe of free-will to religious or Chriſtian works. For after having explained in the Saxon Confeſſion of Faith the nature of free-will, and the manner in which it makes a choice, and having alſo ſhown, that it is not of itſelf ſufficient in thoſe works, or actions, which regard a future life, he affirms twice "that the will, even after having received the influence of the Holy Spirit, does not remain idle," that is to ſay, it is not merely paſſive under the influence of grace, but can reject it, or co-operate with it, at pleaſure. Neceſſity, it is true, obliged him to expreſs his opinion rather obſcurely. But what he inſinuates only in theſe laſt quoted words, is clearly and fully expreſſed in one of his letters to Calvin. "I had, ſays he, a friend who, in reaſoning upon predeſtination, believed equally the two following things; namely, that every thing happens amongſt men as it is ordained by Providence, but that there is, nevertheleſs, a contingency in actions or in events. He confeſſed, however, that he was unable to reconcile theſe two things. For my part, (continues Melancthon), who am of opinion, that God neither wiſhes for, nor is the cauſe of ſin, I acknowledge this contingency in the feebleneſs of our judgement, in order that the ignorant may confeſs, that David fell of himſelf, and voluntarily, into ſin; that he had it in his power to preſerve the grace of the Holy Spirit which he had within him, and that in this combat, or trial, it is neceſſary to acknowledge ſome exerciſe or action of the will *". This opinion he confirms and illuſtrates by a paſſage from St Baſil, where he ſays, "Have but the will, or the inclination, and God is with you." By which words Melancthon ſeems to inſinuate, that the will is not only active in the works of religion, but even begins them without grace. This, however, was not the meaning of St Baſil, as is evident from ſeveral other parts of his writings; but that it was the opinion of Melancthon appears fully from this paſſage, as well as from that which we have cited from the Confeſſion of Augſburg, in which he inſinuates, that the error is not in ſaying, that the will can of itſelf commence, but in thinking, that it can without grace finiſh or complete, religious or Chriſtian works. Thus it appears, that he conſidered the will capable of rejecting the influence of grace, ſince he declares, that David could preſerve the Holy Spirit when he loſt it, as well as he could loſe it when he kept it within him. But although this was his decided opinion, he durſt not avow it fully in the Saxon Confeſſion of Faith, but was obliged to content himſelf with inſinuating it gently in theſe words, "The will, even after receiving the grace of the Holy Spirit, is not idle or without action." All this precaution, however, was inſufficient to ſave Melancthon from cenſure. Francowitz, better known by the name of Illyricus, being jealous of him and his enemy, by his influence with his party procured the condemnation of theſe words of the Saxon Confeſſion, and of the paſſage from St Baſil, at two ſynods held by the Reformers; at the ſame time, that one party of the Lutherans were unwilling to adopt Melancthon's opinion, "that the will is not paſſive, when under the influence of grace," we are at a loſs to think how they could deny it, ſince they almoſt unanimouſly confeſs, that a perſon under the influence of grace may reject and loſe it. This opinion is avowed in the Confeſſion of Augſburg and in Melancthon's Apology. It was even, long after that, decided upon anew, inculcated ſtrongly in their book of Concord, and was brought frequently againſt them by their opponents as a proof of inconſiſtency and contradiction.

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Theſe are not the only inſtances in which the Lutherans were charged with Semipelagian principles. One of the ableſt and the moſt learned of their opponents, we cannot help thinking, had in more than one inſtance made good the charge againſt them. To prove this we need only refer to the remarks that have been made on the eight celebrated propoſitions in the third book of Concord, relative to the co-operation of the will with grace. According to the firſt ſeven of theſe propoſitions, an attentive liſtening to the preaching of the word of God produceth grace; and according to the fifth, any man, even a libertine or an infidel, is free, or has it in his power to liſten attentively to the preaching of the word of God. He has it then in his power to give to himſelf that which to him is productive of grace, and may thus be the ſole author of his own converſion

or

* See *the 18th article, and Melancthon's Apology.*

* See *Calvin's Letters.*

Semipelagians, Semiramis.

or regeneration. In the eighth propoſition it is affirmed, that we are not permitted to doubt, but that the grace of the Holy Spirit, even though it may not be felt, does accompany an attentive hearing of the word of God; and to do away every doubt about the ſpecies of attention which they mean, we muſt obſerve, that they ſpeak of attention in as much as it precedes the grace of the Holy Spirit, and of that attention which, in conſequence of its dependence on free-will, we have it in our power to beſtow upon the word or not, juſt as we pleaſe. It is the exerciſe of this free attention which they ſay operates grace. But here it would ſeem, that they were in extremes; for, as they ſaid upon one hand, that, when the Holy Spirit begins to move us, we act not at all; ſo they maintained on the other, that this operation of the Holy Spirit, which converts us without any co-operation on our part, is neceſſarily attendant upon an act of our wills, in which the Holy Spirit has no ſhare, and in which our liberty acts purely by its natural force or power. Such of our readers as are anxious to examine the progreſs of the Pelagian and Semipelagian principles after the dawn of the Reformation, we muſt refer to the works of the principal reformers and to thoſe of their adverſaries, as well as to the different writers upon eccleſiaſtical hiſtory.

SEMIRAMIS, in fabulous hiſtory, a celebrated queen of Aſſyria, daughter of the goddeſs Derceto, by a young Aſſyrian. She was expoſed in a deſert; but her life was preſerved by doves for one whole year, till Simmas, one of the ſhepherds of Ninus, found her and brought her up as his own child. Semiramis, when grown up, married Menones, the governor of Nineveh, and accompanied him to the ſiege of Bactria; where, by her advice and prudent directions, ſhe haſtened the king's operations, and took the city. Theſe eminent ſervices, together with her uncommon beauty, endeared her to Ninus. The monarch aſked her of her huſband, and offered him his daughter Soſana in her ſtead; but Menones, who tenderly loved Semiramis, refuſed; and when Ninus had added threats to entreaties, he hanged himſelf. No ſooner was Menones dead, than Semiramis, who was of an aſpiring ſoul, married Ninus, by whom ſhe had a ſon called *Ninyas*. Ninus was ſo fond of Semiramis, that at her requeſt he reſigned the crown, and commanded her to be proclaimed queen and ſole empreſs of Aſſyria. Of this, however, he had cauſe to repent: Semiramis put him to death, the better to eſtabliſh herſelf on the throne; and when ſhe had no enemies to fear at home, ſhe began to repair the capital of her empire, and by her means Babylon became the moſt ſuperb and magnificent city in the world. She viſited every part of her dominions, and left everywhere immortal monuments of her greatneſs and benevolence. To render the roads paſſable and communication eaſy, ſhe hollowed mountains and filled up valleys, and water was conveyed at a great expence by large and convenient aqueducts to barren deſerts and unfruitful plains. She was not leſs diſtinguiſhed as a warrior: Many of the neighbouring nations were conquered; and when Semiramis was once told as ſhe was dreſſing her hair, that Babylon had revolted, ſhe left her toilette with precipitation, and though only half dreſſed, ſhe refuſed to have the reſt of her head adorned before the ſedition was quelled and tranquillity re-eſtabliſhed. Semiramis has been accuſed of licentiouſneſs; and ſome authors have obſerved that ſhe regularly called the ſtrongeſt and ſtouteſt men in her army to her arms, and afterwards put them to death, that they might not be living witneſſes of her incontinence. Her paſſion for her ſon was alſo unnatural; and it was this criminal propenſity which induced Ninyas to deſtroy his mother with his own hands. Some ſay that Semiramis was changed into a dove after death, and received immortal honours in Aſſyria. It is ſuppoſed that ſhe lived about 11 centuries before the Chriſtian era, and that ſhe died in the 62d year of her age and the 25th of her reign. Many fabulous reports have been propagated about Semiramis, and ſome have declared that for ſome time ſhe diſguiſed herſelf and paſſed for her ſon Ninyas. *Lempriere's Bibliotheca Claſſica.*

Semiramis || Senate.

SEMPERVIVUM, HOUSE LEEK, a genus of plants belonging to the claſs dodecandria; and in the natural method ranking under the 13th order, *Succulentæ*. See BOTANY *Index*.

SENAAR, or SENNAAR. See SENNAAR.

SENATE, in general, is an aſſembly or council of ſenators; that is, of the principal inhabitants of a ſtate, who have a ſhare in the government.

The ſenate of ancient Rome is of all others the moſt celebrated. It exerciſed no contentious juriſdiction; but appointed judges, either from among the ſenators or knights, to determine proceſſes: it alſo appointed governors of provinces, and diſpoſed of the revenues of the commonwealth, &c. Yet did not the whole ſovereign power reſide in the ſenate, ſince it could not elect magiſtrates, make laws, or decide of war and peace; in all which caſes the ſenate was obliged to conſult the people.

The ſenate, when firſt inſtituted by Romulus, conſiſted of 100 members; to whom he afterwards added the ſame number when the Sabines had migrated to Rome. Tarquin the ancient made the ſenate conſiſt of 300, and this number remained fixed for a long time; but afterwards it fluctuated greatly, and was increaſed firſt to 700, and afterwards to 900 by Julius Cæſar, who filled the ſenate with men of every rank and order. Under Auguſtus the ſenators amounted to 1000, but this number was reduced, and fixed to 600. The place of a ſenator was always beſtowed upon merit: the monarchs had the privilege of chooſing the members; and after the expulſion of the Tarquins, it was one of the rights of the conſuls, till the election of the cenſors, who from their office ſeemed moſt capable of making choice of men whoſe character was irreproachable, whoſe morals were pure, and relations honourable. Only particular families were admitted into the ſenate; and when the plebeians were permitted to ſhare the honours of the ſtate, it was then required that they ſhould be born of free citizens. It was alſo required that the candidates ſhould be knights before their admiſſion into the ſenate. They were to be above the age of 25, and to have previouſly paſſed through the inferior offices of quæſtor, tribune of the people, edile, pretor, and conſul.

The ſenate always met of courſe on the 1ſt of January, for the inauguration of the new conſuls; and in all months, univerſally, there were three days, viz. the kalends, nones, and ides, on which it regularly met: but it always met on extraordinary occaſions, when called together by conſul, tribune, or dictator.

To render their decrees valid and authentic, a certain number of members was requiſite, and ſuch as

Senate || Senatus.

were abſent without ſome proper cauſe were always fined. In the reign of Auguſtus, 400 ſenators were requiſite to make a ſenate. Nothing was tranſacted before ſunriſe or after ſunſet. In their office the ſenators were the guardians of religion, they diſpoſed of the provinces as they pleaſed, they prorogued the aſſemblies of the people, they appointed thankſgivings, nominated their ambaſſadors, diſtributed the public money, and in ſhort had the management of every thing political or civil in the republic, except the creating of magiſtrates, the enacting of laws, and the declaration of war or peace, which were confined to the aſſemblies of the people.

SENATOR, in general, denotes a member of ſome ſenate.

The dignity of a Roman ſenator could not be ſupported without the poſſeſſion of 80,000 ſeſterces, or about 7000l. Engliſh money; and therefore ſuch as ſquandered away their money, and whoſe fortune was reduced below this ſum, were generally ſtruck out of the liſt of ſenators. This regulation was not made in the firſt ages of the republic, when the Romans boaſted of their poverty. The ſenators were not permitted to be of any trade or profeſſion. They were diſtinguiſhed from the reſt of the people by their dreſs; they wore the laticlave, half-boots of a black colour, with a creſcent or ſilver buckle in the form of a C; but this laſt honour was confined only to the deſcendants of thoſe hundred ſenators who had been elected by Romulus, as the letter C ſeems to imply. See the preceding article.

Among us, ſenator is a member of parliament. In the laws of King Edward the Confeſſor, we are told that the Britons called thoſe *ſenators* whom the Saxons called afterwards *aldermen* and *borough-maſters;* though not for their age, but their wiſdom; for ſome of them were young men, but very well ſkilled in the laws. Kenulph king of the Mercians granted a charter, which ran thus, viz. *Conſilio et conſenſu* epiſcoporum *et* ſenatorum *gentis ſuæ largitus fuit dicto monaſterio*, &c.

In Scotland, the lords of ſeſſion are called *ſenators* of the college of juſtice.

SENATUS AUCTORITAS. See the next article.

SENATUS-Conſultum, which made part of the Roman law. When any public matter was introduced into the ſenate, which was always called *referre ad ſenatum*, any ſenator whoſe opinion was aſked, was permitted to ſpeak upon it as long as he pleaſed, and on that account it was often uſual for the ſenators to protract their ſpeeches till it was too late to determine. When the queſtion was put, they paſſed to the ſide of that ſpeaker whoſe opinion they approved, and a majority of votes was eaſily collected, without the trouble of counting the numbers. When the majority was known, the matter was determined, and a *ſenatus conſultum* was immediately written by the clerks of the houſe, at the feet of the chief magiſtrates, and it was ſigned by all the principal members of the houſe. When there was not a ſufficient number of members to make a ſenate, the deciſion was called *ſenatus auctoritas*, but it was of no force if it did not afterwards paſs into a *ſenatus conſultum*.

The *ſenatus conſulta* were at firſt left in the cuſtody of the kings, and afterward of the conſuls, who could ſuppreſs or preſerve them; but about the year of Rome 304, they were always depoſited in the temple of Ceres, and afterwards in the treaſury, by the ediles of the people. Seneca.

SENECA, LUCIUS ANNÆUS, a Stoic philoſopher, was born at Corduba in Spain, about the beginning of the Chriſtian era, of an equeſtrian family, which had probably been tranſplanted thither in a colony from Rome. He was the ſecond ſon of Marcus Annæus Seneca, commonly called the *rhetorician*, whoſe remains are printed under the title of *Suaſoriæ et Controverſiæ, cum Declamationum Excerptis;* and his youngeſt brother Annæus Mela (for there were three of them) had the honour of being father to the poet Lucan. He was removed to Rome, together with his father and the reſt of his family, while he was yet in his infancy. There he was educated in the moſt liberal manner, and under the beſt maſters. He learned eloquence from his father; but his genius rather leading him to philoſophy, he put himſelf under the ſtoics Attalus, Sotion, and Papirius Fabianus; men famous in their way, and of whom he has made honourable mention in his writings. It is probable, too, that he travelled when he was young, ſince we find him, in ſeveral parts of his works, particularly in his *Quæſtiones Naturales*, making very exact and curious obſervations upon Egypt and the Nile.—But this, though entirely agreeable to his own humour, did not at all correſpond with that ſcheme or plan of life which his father had drawn out for him; who, therefore, forced him to the bar, and put him upon ſoliciting for public employments; ſo that he afterwards became quæſtor, prætor, and, as Lipſius will have it, even conſul.

In the firſt year of the reign of Claudius, when Julia the daughter of Germanicus was accuſed of adultery by Meſſalina, and baniſhed, Seneca was baniſhed too, being charged as one of the adulterers. Corſica was the ſeat of his exile, where he lived eight years; "happy in the midſt of thoſe things which uſually make other people miſerable;" *inter eas res beatus, quæ ſolent miſeros facere:* and here he wrote his books of conſolation, addreſſed to his mother Helvia, and to his friend Polybius, and perhaps ſome of thoſe tragedies which go under his name; for he ſays, *modo ſe levioribus ſtudiis ibi oblectaſſe.* Agrippina being married to Claudius, upon the death of Meſſalina, ſhe prevailed with the emperor to recal Seneca from baniſhment; and afterwards procured him to be tutor to her ſon Nero, whom ſhe deſigned for the empire. Africanus Burrhus, a prætorian præfect, was joined with him in this important charge: and theſe two preceptors, who were entruſted with equal authority, had each his reſpective department. By the bounty and generoſity of his royal pupil, Seneca acquired that prodigious wealth which rendered him in a manner equal to kings. His houſes and walks were the moſt magnificent in Rome. His villas were innumerable: and he had immenſe ſums of money placed out at intereſt in almoſt every part of the world. The hiſtorian Dio reports him to have had 250,000l. ſterling at intereſt in Britain alone; and reckons his calling it in all at a ſum, as one of the cauſes of a war with that nation.

All this wealth, however, together with the luxury and effeminacy of a court, does not appear to have had any ill effect upon the temper and diſpoſition of Seneca. He continued abſtemious, exact in his manners, and

Seneca. and, above all, free from the vices ſo commonly prevalent in ſuch places, flattery and ambition. "I had rather (ſaid he to Nero) offend you by ſpeaking the truth, than pleaſe you by lying and flattery: *maluerim veris offendere, quam placere adulando.*" How well he acquitted himſelf in quality of preceptor to his prince, may be known from the five firſt years of Nero's reign, which have always been conſidered as a perfect pattern of good government; and if that emperor had but been as obſervant of his maſter through the whole courſe of it, as he was at the beginning, he would have been the delight, and not, as he afterwards proved, the curſe and deteſtation of mankind. But when Poppæa and Tigellinus had got the command of his humour, and hurried him into the moſt extravagant and abominable vices, he ſoon grew weary of his maſter, whoſe life muſt indeed have been a conſtant rebuke to him. Seneca, perceiving that his favour declined at court, and that he had many accuſers about the prince, who were perpetually whiſpering in his ear the great riches of Seneca, his magnificent houſes and fine gardens, and what a favourite through means of theſe he was grown with the people, made an offer of them all to Nero. Nero refuſed to accept them: which, however, did not hinder Seneca from changing his way of life; for, as Tacitus relates, he "kept no more levees, declined the uſual civilities which had been paid to him, and, under a pretence of indiſpoſition, or ſome engagement or other, avoided as much as poſſible appearing in public."

Nero, in the mean time, who, as it is ſuppoſed, had diſpatched Burrhus by poiſon, could not be eaſy till he had rid himſelf of Seneca alſo: For Burrhus was the manager of his military concerns, and Seneca conducted his civil affairs. Accordingly, he attempted, by means of Cleonicus, a freedman of Seneca, to take him off by poiſon; but this not ſucceeding, he ordered him to be put to death, upon an information that he was privy to Piſo's conſpiracy againſt his perſon. Not that he had any real proof of Seneca's being concerned in this plot, but only that he was glad to lay hold of any pretence for deſtroying him.—He left Seneca, however, at liberty to chooſe his manner of dying; who cauſed his veins to be opened immediately. His wife Paulina, who was very young in compariſon of himſelf, had yet the reſolution and affection to bear him company, and thereupon ordered her veins to be opened at the ſame time; but as Nero was not willing to make his cruelty more odious and inſupportable than there ſeemed occaſion for, he gave orders to have her death prevented: upon which her wounds were bound up, and the blood ſtopped, in juſt time enough to ſave her; though, as Tacitus ſays, ſhe looked ſo miſerably pale and wan all her life after, that it was eaſy to read the loſs of her blood and ſpirits in her countenance. In the mean time, Seneca, finding his death ſlow and lingering, deſired Statius Annæus his phyſician to give him a doſe of poiſon, which had been prepared ſome time before in caſe it ſhould be wanted; but this not having its uſual effect, he was carried to a hot bath, where he was at length ſtifled with the ſteams. He died, as Lipſius conjectures, in the 63d or 64th year of his age, and in about the 10th or 11th of Nero's reign. Tacitus, on mentioning his death, obſerves, that, as he entered the bath, he took of the water, and with it ſprinkled ſome of his neareſt domeſtics, ſaying, "That he offered thoſe libations to Jupiter the Deliverer." Theſe words are an evident proof that Seneca was not a Chriſtian, as ſome have imagined him to have been; and that the 13 epiſtles from Seneca to St Paul, and from St Paul to Seneca, are ſuppoſititious pieces. His philoſophical works are well known.—They conſiſt of 124 *epiſtles* and diſtinct treatiſes; and, except his books of phyſical queſtions, are chiefly of the moral kind, treating of anger, conſolation, providence, tranquillity of mind, conſtancy, clemency, the ſhortneſs of life, a happy life, retirement, benefits. He has been juſtly cenſured by Quintilian and other critics, as one of the firſt corrupters of the Roman ſtyle; but his works are highly valuable, on account of the vaſt erudition which they diſcover, and the beautiful moral ſentiments which they contain.

Seneca || Senegal.

SENECIO, GROUNDSEL; a genus of plants belonging to the claſs ſyngeneſia, and to the order of polygamia ſuperflua; and in the natural method ranking under the 49th order, *Compoſitæ*. See BOTANY *Index*.

SENEGAL, a part of Negroland in Africa, the boundaries of which are not known. See GUINEA.

Iſle of SENEGAL, ſometimes called *Saint Louis*, is a ſmall iſland in the mouth of the river Senegal, and according to Maſkelyne's tables is ſituated in N. Lat. 15. 53. W. Long. 16. 31. The Dutch were the firſt Europeans who ſettled at Senegal; but their colony was expelled by the French in 1687. It was taken by the Engliſh in 1692; and retaken by the French the year following. It was a ſecond time taken poſſeſſion of by the Engliſh in 1758; but in 1779 the French recovered it, and it was ceded by the Britiſh crown by the treaty of 1783.

The beſt account of this iſland which we have ſeen, is given in the intereſting voyage of M. Saugnier to the coaſt of Africa. This adventurer viſited Senegal in June 1785.

"The iſland (ſays he), properly ſpeaking, is only a bank of ſand in the middle of the river. It is 1000 geometrical paces long, and about 60 in its greateſt width; is almoſt on a level with the river and with the ſea, being defended from the latter by Barbary point, which is of greater elevation than the colony. The eaſtern branch of the river is the more conſiderable of the two, being about 400 toiſes acroſs; the weſtern branch is only from 50 to 200 toiſes wide. The iſle conſiſts entirely of burning ſands, on the barren ſurface of which you ſometimes meet with ſcattered flints, thrown out among their ballaſt by veſſels coming from Goree, or with the ruins of buildings formerly erected by Europeans. There is ſcarcely ſuch a thing as a garden upon the iſland; European ſeeds in general not thriving here. It is not ſurpriſing that the ſoil is ſo unproductive; for the air is ſtrongly impregnated with ſea ſalt, which pervades every thing, and conſumes even iron in a very ſhort ſpace of time. The heats are exceſſive, and rendered ſtill more inſupportable by the reflection of the ſand; ſo that from ten in the morning until four in the afternoon it is almoſt impoſſible to do any work. During the months of January, February, March, and April, the heats are moderated; but in Auguſt and the following months they become ſo oppreſſive as even to affect the natives themſelves. What effect then muſt they have upon the Europeans, ſuddenly tranſported into this burning climate? The nights are a little leſs ſultry; not always, however, but only when the ſea-breeze ſets in. It is then that the inhabitants of the colony breathe a freſher air, for which they have been

Senegal. been longing the whole of the day; but this air in our climate would ſeem a burning vapour. The nights are nevertheleſs troubleſome, notwithſtanding the comforts of the ſea-breeze. The inſtant the ſun is ſet, we are aſſailed by an infinity of gnats, which are called *muſquitos;* their ſtings are very painful, and their multitudes incredible. The inhabitants find but a poor defence in their gauze-curtains. For my own part, accuſtomed as I had been to live among the Moors, I was but little annoyed by theſe inſects. Being half a ſavage, I felt no deſire to recommend myſelf to the favourable regard of the fair ſex, and I was therefore under no neceſſity of taking care of my perſon. In imitation of my former maſters, I ſmeared myſelf with butter, and this expedient preſerved me at all times from theſe impertinent ſtingers, theſe ſpiteful enemies to the repoſe of the human kind.

"If the proſpect of Senegal is not agreeable to the eye, much leſs are its environs, which are covered over only with ſand, and overrun with mangoes. It may be ſaid, without exaggeration, that there is not a more forlorn ſituation to be found on the face of the inhabited globe, or a place in which the common neceſſaries of life are procured with greater difficulties. Water, that indiſpenſable aliment of man, is here not potable. Wells are dug in the ſand to the depth of five or ſix feet, and water is obtained by theſe means; but whatever pains are taken to freſhen it, it ever retains a brackiſh taſte. I have diſtilled this water myſelf, and obſerved that it always had a diſagreeable ſavour, which cannot fail to be hurtful to the health: it is true, that when the river is high, its ſtreams are freſh, but the water is only the more dangerous. It proves the cauſe of moſt of thoſe maladies which carry off the Europeans ſo rapidly, that at the end of every three years the colony has a freſh ſet of inhabitants. The blacks themſelves, although accuſtomed to the climate, are not in this ſeaſon free from diſeaſe."

The fort of St Louis is a quadrangle, and has two baſtions of conſiderable ſtrength; but the greateſt ſecurity of the fort is its natural ſituation. The cannon of the fort are numerous, and the arſenal well ſupplied with ſmall arms and ſtores. Beſides this fort the French had no other upon the river, except Fort St Joſeph, which ſtands about four leagues below the cataract at Govina, though they had a few factories in different parts.

The principal commodity of this country is that of gum Senegal (ſee *GUM-Senegal*), which is a valuable branch of commerce, as it is uſed in many arts and manufactures, particularly by the painters in water-colours, the ſilk weavers, and dyers.

The French import from the river Senegal not only gum-arabic, but elephants teeth, hides, bees-wax, gold-duſt, cotton, oſtrich feathers, ambergris, indigo, and civet.

Notwithſtanding the barrenneſs of the ſpot, Senegal contains more than 6000 negroes, including the captives of the Tapades, or negroes born of the black inhabitants of the country. They are never put up to ſale, unleſs convicted of ſome crime. Their huts, conſtructed in the form of bee-hives, and ſupported upon four ſtakes, ſurround the habitations of the negro inhabitants. The entire height of thoſe huts may riſe to about 12 feet, the width in every direction is commonly from 10 to 12. The beds are compoſed of hurdles laid upon croſs-bars, ſupported by forked ſtakes at the height of about a foot from the ground. Here the ſlaves ſleep promiſcuouſly, men, women, girls, and boys. A fire is made in the middle of the hut, which is filled with ſmoke, ſufficient to ſtifle any man but a negro. Senegal.

The men are tall, and the women are accounted the handſomeſt negreſſes of all Africa. The Senegalians may be conſidered as the moſt courageous people of that part of the world, without even excepting the Moors. Their courage, however, is more nearly allied to temerity than to bravery. In the courſe of the voyage to Galam, they meet the greateſt dangers with gaiety and ſong; they dread neither muſket nor cannon, and are equally fearleſs of the cayman or crocodile. Should one of their companions be killed, and devoured by theſe animals before their face, they are not deterred from plunging into the water, if the working of the ſhip require it. Theſe excellent qualifications which diſtinguiſh them, and on which they value themſelves ſo much, do not, however, preſerve them from the common contagion of the country, which inclines them all to rapine. They are emulous to ſurpaſs one another in all the arts of over-reaching and fraud. The conduct of the Europeans has, no doubt, encouraged theſe vices as much as the leſſons of the marabous, who inculcate the duty of plundering the Chriſtians to the utmoſt of their power.

The Yolof negroes of Senegal are either Chriſtians or Mahometans, or rather one and the other, or with more truth neither; religion being a matter of indifference to them. Thoſe on the continent are of the ſame way of thinking, and their religious practices are kept up only for the ſake of form. A bar of iron, a few beads, will make them change their opinion at will. By ſuch means are they acted upon; a ſufficient proof of their want of all religious principle. The marabous, or prieſts, and the men of their law, are no better than the reſt. "I have examined the character of ſeveral of this order of men (ſays M. Saugnier), and even among the nation of the Poules, who are conſidered as great fanatics, I diſcovered that they were only publicly attached to their opinions. 'This white man (ſay they) does ſo; he is better informed than I, and why ſhould not I imitate his example?'" This way of reaſoning is common to all that tract of country.

The colony of Senegal is ſurrounded with iſlands, which, on account of the proximity of the ſea, are all more unhealthy than that on which the town is built. They are full of ſtanding pools, that, when dried up by the ſun, exhale a putrid vapour that carries mortality with it, and deſolates theſe iſlands. It is doubtleſs the ſame cauſe that takes off ſo many of the French at Senegal during the dangerous ſeaſon of the year. This alſo may be in part occaſioned by the bad quality of the water, which flows from the ponds in the neighbourhood of the colony, and though incorporated with that of the river, comes down little agitated by the current, and is eaſily diſtinguiſhed by a vapidneſs of taſte. This particular is, in my opinion, eſſentially worthy of notice, and if properly attended to by our medical men, might become the means of preſerving many lives.

SENEGAL-River, ſee NIGER. As ſo little is known reſpecting this river, which is one of the greateſt in Africa, any additional information muſt be intereſting.

Senegal. We ſhall therefore preſent our readers with the account contained in the communications preſented to the Aſſociation for promoting the diſcovery of the Interior Parts of Africa, which, as far as we know, is the lateſt and moſt authentic.

The river known to Europeans by the name of *Niger* or *Senegal* runs on the ſouth of the kingdom of Caſhna, in its courſe towards Tombuctou; and if the report which Ben Alli heard in that town may be credited, it is afterwards loſt in the ſands on the ſouth of the country of Tombuctou. In the map (A), only the known part of its courſe is marked by a line; and the ſuppoſitious part by dots. It may be proper to obſerve, that the Africans have two names for this river; that is, *Neel il Abeed*, or river of the Negroes; and *Neel il Kibeer*, or the great river. They alſo term the Nile (that is the Egyptian river) *Neel Shem;* ſo that the term *Neel*, from whence our Nile, is nothing more than the appellative of river; like Ganges, or Sinde.

Of this river the riſe and termination are unknown, but the courſe is from eaſt to weſt. So great is its rapidity, that no veſſel can aſcend its ſtream; and ſuch is the want of ſkill, or ſuch the abſence of commercial inducements among the nations who inhabit its borders, that even with the current, neither veſſels nor boats are ſeen to navigate. In one place, indeed, the traveller finds accommodations for the paſſage of himſelf and of his goods; but even there, though the ferrymen, by the indulgence of the ſultan of Caſhna, are exempted from all taxes, the boat which conveys the merchandiſe is nothing more than an ill-conſtructed raft; for the planks are faſtened to the timbers with ropes, and the ſeams are cloſed both within and without by a plaſter of tough clay, of which a large proviſion is always carried on the raft, for the purpoſe of excluding the ſtream wherever its entrance is obſerved.

The depth of the river at the place of paſſage, which is more than a hundred miles to the ſouth of the city of Caſhna, the capital of the empire of that name, is eſtimated at 23 or 24 feet Engliſh. Its depth is from 10 to 12 pecks, each of which is 27 inches.

Its width is ſuch, that even at the iſland of Gongoo, where the ferrymen reſide, the ſound of the loudeſt voice from the northern ſhore is ſcarcely heard; and at Tombuctou, where the name of *Gnewa*, or black, is given to the ſtream, the width is deſcribed as being that of the Thames at Weſtminſter. In the rainy ſeaſon it ſwells above its banks, and not only floods the adjacent lands, but often ſweeps before it the cattle and cottages of the ſhort-ſighted or too confident inhabitants.

That the people who live in the neighbourhood of the Niger ſhould refuſe to profit by its navigation, may juſtly ſurpriſe the traveller: but much greater is his aſtoniſhment, when he finds that even the food which the bounty of the ſtream would give, is uſeleſsly offered to their acceptance; for ſuch is the want of ſkill, or ſuch the ſettled diſlike of the people to this ſort of proviſion, that the fiſh with which the river abounds are left in undiſturbed poſſeſſion of its waters.

SENEKA, or SENECA, *Rattleſnake-root*, *Milk-wort*. See POLYGALA, BOTANY and MATERIA MEDICA *Index*. Seneka || Senn.

SENESCHAL, (*Seneſchallus*), derived from the German *ſein*, "a houſe or place," and *ſcale*, "an officer," is a ſteward, and ſignifies one who has the diſpenſing of juſtice in ſome particular caſes: As the high ſeneſchal or ſteward of England; *ſeneſchal de la hotel de roi*, "ſteward of the king's houſehold, ſeneſchal, or ſteward of courts, &c." *Co. Lit.* 61. *Croke's Juriſd.* 102. *Kitch.* 83. See STEWARD.

SENN, a ſort of itinerant cow-keeper in Switzerland, particularly in the canton of Appenzell. Theſe men do not raiſe as much hay as is requiſite for their cattle during the winter, and ſome of them have no graſs lands. To ſupply this defect, they employ agents throughout the canton, whoſe province it is to inform them where good hay may be obtained, when the ſenn, who is in want of fodder, agrees with the more opulent farmers for the winter, to whom he ſucceſſively drives his cattle when they return from the graſs, in conſequence of which he often viſits five different places during the winter. The perſon who ſells the hay provides the ſenn with ſtabling for his beaſts, and with board and lodgings for himſelf and family. The ſenn pays the ſtipulated price for the hay, and allows his hoſt as much milk, whey, and a kind of lean cheeſe, as may be made uſe of in the family, and alſo leaves him the manure of his cows. In the middle of April, the ſenn again iſſues forth with his herd to the fertile Alps, which he rents during the ſummer.

Fine cattle are the pride of the cow-keeper who inhabits the Alps. He adorns his beſt cows with large bells ſuſpended from broad thongs, which are manufactured and ſold by the inhabitants of the Tyrol. Theſe are faſtened round the cow's neck by means of a large buckle. The largeſt of theſe bells meaſure a foot in diameter, ſwelling out in the middle, and tapering towards the end. The whole peal of bells, including the thongs, is worth 150 guilders, while the apparel of the ſenn himſelf, even in his beſt attire, is not worth more than 20 guilders. Theſe bells are chiefly worn in the ſpring, when driven to the Alps, and in the autumn or winter. It is ſurpriſing to ſee how proud and pleaſed the cows ſtalk forth when ornamented with their bells. One would ſcarcely imagine how ſenſible theſe animals are of their rank, and even touched with vanity and jealouſy! Should the leading cow be deprived of her honours, ſhe is grieved at the diſgrace, which is manifeſted by her conſtant lowing, abſtaining from food, and growing lean. The rival, on whom the badge of diſtinction has devolved, feels her marked vengeance, being wounded and perſecuted by her in the moſt furious manner, until the former either recovers her bell, or is removed from the herd. However ſingular this may appear, it is rendered indiſputable by the concurring teſtimony of centuries.

The voice of the ſenn brings the cows together, when diſperſed on the Alps, who is then ſaid to allure them. That the cattle can well diſtinguiſh the note of their keeper,

(A) The map alluded to is that which accompanies the volume which contains the proceedings of the Aſſociations. This work was printed in 1791.

Senna, Sennaar.

keeper, appears from their haſtening to him, though at a great diſtance. He furniſhes that cow which is in the habit of ſtraying fartheſt with a ſmall bell, and by her arrival he knows that all the reſt are aſſembled.

SENNA, the leaf of the caſſia ſenna of Linnæus. See CASSIA, BOTANY and MATERIA MEDICA *Index*.

Senna appears to have been cultivated in England in the time of Parkinſon (1640); and Miller tells us, that by keeping theſe plants in a hotbed all the ſummer, he frequently had them in flower; but adds, it is very rarely that they perfect their ſeeds in England. There can be little doubt, however, but that ſome of the Britiſh poſſeſſions may be found well enough adapted to the growth of this vegetable, and that the patriotic views of the Society for encouraging Arts, &c. which has offered a reward to thoſe who ſucceed in the attempt, will be ultimately accompliſhed.

Woodville's Medical Botany.

Senna, which is in common uſe as a purgative, was firſt known to the Arabian phyſicians Serapion and Meſue: the firſt among the Greeks who takes any notice of it is Actuarius, but he only ſpeaks of the fruit, and not of the leaves. To remove the diſagreeable taſte of this medicine, Dr Cullen recommends coriander ſeeds; and, for preventing the gripings with which it is ſometimes attended, he thinks the warmer aromatics, as cardamoms or ginger, would be more effectual.

The *Senna Italica*, or blunt-leaved ſenna, is a variety of the Alexandrian ſpecies; which, by its cultivation in the ſouth of France (Provence), has been found to aſſume this change. It is leſs purgative than the pointed-leaved ſenna, and is therefore to be given in larger doſes. It was employed as a cathartic by Dr Wright at Jamaica, where it grows on the ſand banks near the ſea.

Lond. Med. Jour. vol. viii.

SENNAAR, a country of Africa, bordering upon Abyſſinia, with the title of a kingdom; the preſent government of which was eſtabliſhed in the 16th century by a race of negroes named, in their own language, *Shillook*. This country, together with all the northern parts of Africa, had been overrun by the Saracens during the rapid conqueſts of the caliphs; but inſtead of erecting any diſtinct principalities here, as in other parts, they had incorporated themſelves with the old inhabitants called *Shepherds*, whom they found at their arrival; had converted them to their religion, and become one people with them. In 1504 the Shillook, a people before unknown, came from the weſtern banks of the river Bahiar el Abiad, which empties itſelf into the Nile, and conquered the country; allowing the Arabs, however, to retain their poſſeſſions on condition of paying them a certain tribute. Theſe founded the city of Sennaar, and have ever ſince continued to carry on an intercourſe with Egypt in the way of merchandiſe. At the eſtabliſhment of their monarchy the whole nation were Pagans, but ſoon after became converts to Mohammedaniſm, and took the name of *Funge*, an appellation ſignifying "lords or conquerors," and likewiſe free citizens. Mr Bruce, who paſſed through this country in his return from Abyſſinia, gives a liſt of 20 kings who have reigned in it ſince the conqueſt of the Shillook.

This country is inhabited by a people ſo barbarous and bruti ſh, that no hiſtory of them can be expected. One of the moſt remarkable of their cuſtoms is, that the king aſcends the throne with the expectation of being murdered whenever the general council of the nation thinks proper. The dreadful office of executioner belongs to one ſingle officer, ſtyled, in the language of the country, *Sid el Coom;* and who is always a relation of the monarch himſelf. It was from his regiſters that Mr Bruce took the liſt of the kings already mentioned, with the number of years they reigned, and which may therefore be received as authentic. The Sid el Coom in office at the time that Mr Bruce viſited this country was named Achmet, and was one of his beſt friends. He had murdered the late king, with three of his ſons, one of whom was an infant at its mother's breaſt; he was alſo in daily expectation of performing the ſame office to the reigning ſovereign. He was by no means reſerved concerning the nature of his office, but anſwered freely every queſtion that was put to him. When aſked by Mr Bruce why he murdered the king's young ſon in his father's preſence? he anſwered, that he did it from a principle of duty to the king himſelf, who had a right to ſee his ſon killed in a lawful and regular manner, which was by cutting his throat with a ſword, and not in a more painful or ignominious way, which the malice of his enemies might poſſibly have inflicted.

Sennaar.

Bruce's Travels, vol. iv.

The king, he ſaid, was very little concerned at the ſight of his ſon's death, but he was ſo very unwilling to die himſelf, that he often preſſed the executioner to let him eſcape; but finding his intreaties ineffectual, he ſubmitted at laſt without reſiſtance. On being aſked whether he was not afraid of coming into the preſence of the king, conſidering the office he might poſſibly have to perform? he replied, that he was not in the leaſt afraid on this account; that it was his duty to be with the king every morning, and very late in the evening; that the king knew he would have no hand in promoting his death; but that, when the matter was abſolutely determined, the reſt was only an affair of decency; and it would undoubtedly be his own choice, rather to fall by the hand of his own relation in private than by a hired aſſaſſin, an Arab, or a Chriſtian ſlave, in the ſight of the populace. Baady the king's father, having the misfortune to be taken priſoner, was ſent to Atbara to Welled Haſſan the governor of that province to be put to death there. But the king, who was a ſtrong man, and always armed, kept ſo much upon his guard, that Welled could find no opportunity of killing him but by running him through the back with a lance as he was waſhing his hands. For this Welled himſelf was afterwards put to death; not on account of the murder itſelf, but becauſe, in the firſt place, he, who was not the proper executioner, had preſumed to put the king to death; and, in the next, becauſe he had done it with a lance, whereas the only lawful inſtrument was a ſword.

On the death of any of the ſovereigns of this country, his eldeſt ſon ſucceeds to the throne of courſe; on which as many of his brothers as can be found are apprehended, and put to death by the Sid el Coom in the manner already related. Women are excluded from the ſovereignty here as well as in Abyſſinia. The princeſſes of Sennaar, however, are worſe off than thoſe of Abyſſinia, having no ſettled income, nor being treated in any degree better than the daughters of private perſons. The king is obliged, once in his lifetime, to plough and ſow a piece of ground; whence he is named *Baady*, the "countryman or peaſant;" a

title

Sennaar. title as common among the monarchs of Sennaar as Cæſar was among the Romans. The royal family were originally negroes; but as the kings frequently marry Arab women, the white colour of the mother is communicated to the child. This, we are told by Mr Bruce, is invariably the caſe, when a negro man of Sennaar marries an Arab woman; and it holds equally good, when an Arab man marries a negro woman; and he likewiſe informs us, that he never ſaw one black Arab all the time he was at Sennaar.

The ſoil and climate of this country is extremely unfavourable both to man and beaſt. The men are ſtrong and remarkable for their ſize, but ſhort lived; and there is ſuch a mortality among the children, that were it not for a conſtant importation of ſlaves, the metropolis would be depopulated. The ſhortneſs of their lives, however, may perhaps be accounted for, from their indulging themſelves from their infancy in every kind of exceſs. No horſe, mule, or aſs, will live at Sennaar or for many miles round it. The caſe is the ſame with bullocks, ſheep, dogs, cats, and poultry; all of them muſt go to the ſands every half-year. It is difficult to account for this mortality; though Mr Bruce aſſures us it is the caſe everywhere about the metropolis of this country, where the ſoil is a fat earth, during the firſt ſeaſon of the rains. Two greyhounds which he brought along with him from Atbara, and the mules he brought from Abyſſinia, lived only a few weeks after their arrival at Sennaar. Several of the kings of Sennaar have tried to keep lions, but it was always found impoſſible to preſerve them alive after the rains. They will live, however, as well as other quadrupeds, in the ſands, at no great diſtance from the capital. No ſpecies of tree except the lemon flowers near this city; the cultivation of the roſe has often been attempted, but always without ſucceſs. In other reſpects, however, the ſoil of Sennaar is exceedingly fertile, being ſaid to yield 300 fold; but this is thought by Mr Bruce to be a great exaggeration. It is all ſown with dora or millet, which is the principal food of the people; wheat and rice are alſo produced here, which are ſold by the pound, even in years of plenty. The ſoil all round is ſtrongly impregnated with ſalt, ſo that a ſufficient quantity to ſerve the inhabitants is extracted from it.

SENNAAR, a city of Africa, the capital of the kingdom of that name. It ſtands according to Mr Bruce's obſervations, in N. Lat. 13° 34′ 36″, E. Long. 33° 30′ 30″, on the weſt ſide of the Nile, and cloſe upon the banks of it; the ground on which it ſtands being juſt high enough to prevent the inundation. The town is very populous, and contains a great many houſes. In Poncet's time they were all of one ſtory; but now moſt of the officers have houſes of two ſtories high. They are built of clay mixed with a very little ſtraw, and have all flat roofs; which ſhows that the rains here muſt be much leſs in quantity than to the ſouthward. During the time of Mr Bruce's reſidence here, however, there was one week of continual rain, and the Nile, after loud thunder and great darkneſs to the ſouth, increaſed violently; the whole ſtream being covered with the wrecks of houſes and their furniture; ſo that he ſuppoſed it had deſtroyed many villages to the ſouthward. About 12 miles to the north-weſt of Sennaar is a collection of villages named *Shaddly*, from a great ſaint of that name, who conſtructed ſeveral granaries here. Theſe are no other than large pits dug in the ground, Sennaar. and well plaſtered in the inſide with clay, then filled with grain when it is at its loweſt price, and afterwards covered up and plaſtered again at top: theſe pits they call *matamores*. On any proſpect of dearth they are opened, and the corn ſold to the people. About 24 miles north of Shaddly there is another ſet of granaries name *Wed-Aboud*, ſtill greater than Shaddly; and upon theſe two the ſubſiſtence of the Arabs principally depends: for as theſe people are at continual war with each other, and direct their fury rather againſt the crops than the perſons of their enemies, the whole of them would be unavoidably ſtarved, were it not for this extraordinary reſource. Small villages of ſoldiers are ſcattered up and down this country to guard the grain after it is ſown, which is only that ſpecies of millet named *dora;* the ſoil, it is ſaid, being incapable of producing any other. There are great hollows made in the earth at proper diſtances throughout the country, which fill with water in the rainy ſeaſon, and are afterwards of great uſe to the Arabs as they paſs from the cultivated parts to the ſands. The fly, which is ſuch a dreadful enemy to the cattle, is never ſeen to the northward of Shaddly.

To the weſtward of theſe granaries the country is quite full of trees as far as the river Abiad, or El-aice. In this extenſive plain there ariſe two ridges of mountains, one called *Jibbel Moira*, or the *Mountain of water;* the other *Jibbel Segud*, or the *Cold Mountain*. Both of them enjoy a fine climate, and ſerve for a protection to the farms about Shaddly and Aboud already mentioned. Here alſo are fortreſſes placed in the way of the Arabs, which ſerve to oblige them to pay tribute in their flight from the cultivated country, during the rains, to the dry lands of Atbara. Each of theſe diſtricts is governed by a deſcendant of their ancient and native princes, who long reſiſted all the power of the Arabs. Sacrifices of a horrid nature are ſaid to have been offered up on theſe mountains till about the year 1554, when one of the kings of Sennaar beſieged firſt one and then the other of the princes in their mountains; and having forced them to ſurrender, he faſtened a chain of gold to each of their ears, expoſed them in the market-place at Sennaar, and ſold them for ſlaves at leſs than a farthing each. Soon after this they were circumciſed, converted to the Mahometan religion, and reſtored to their kingdoms.

" Nothing (ſays Mr Bruce) is more pleaſant than Vol. iv.
the country around Sennaar in the end of Auguſt and p. 475.
beginning of September. The grain, being now ſprung up, makes the whole of this immenſe plain appear a level green land, interſperſed with great lakes of water, and ornamented at certain intervals with groups of villages; the conical tops of the houſes preſenting at a diſtance the appearance of ſmall encampments. Through this very extenſive plain winds the Nile, a delightful river there, above a mile broad, full to the very brim, but never overflowing. Everywhere on theſe banks are ſeen herds of the moſt beautiful cattle of various kinds. The banks of the Nile about Sennaar reſemble the pleaſanteſt part of Holland in the ſummer ſeaſon; but ſoon after, when the rains ceaſe, and the ſun exerts its utmoſt influence, the dora begins to ripen, the leaves to turn yellow and to rot, the lakes to putrefy, ſmell, become full of vermin, and all its beauty ſuddenly diſappears: bare ſcorched Nubia returns, and all its terrors of poi-

Sennaar. ſonous winds and moving ſands, glowing and ventilated with ſultry blaſts, which are followed by a troop of terrible attendants; epilepſies, apoplexies, violent fevers, obſtinate agues, and lingering painful dyſenteries, ſtill more obſtinate and mortal.

"War and treaſon ſeem to be the only employment of this horrid people, whom Heaven has ſeparated by almoſt impaſſable deſerts from the reſt of mankind; confining them to an accurſed ſpot, ſeemingly to give them an earneſt in time of the only other curſe which he has reſerved to them for an eternal hereafter."

With regard to the climate of the country round Sennaar, Mr Bruce has ſeveral very curious obſervations. The thermometer riſes in the ſhade to 119 degrees; but the degree indicated by this inſtrument does not at all correſpond with the ſenſations occaſioned by it; nor with the colour of the people who live under it. "Nations of blacks (ſays he) live within latitude 13 and 14 degrees; about 10 degrees ſouth of them, nearly under the line, all the people are white, as we had an opportunity of obſerving daily in the Galla. Sennaar, which is in latitude 13 degrees, is hotter by the thermometer 50 degrees, when the ſun is moſt diſtant from it, than Gondar, which is a degree farther ſouth, when the ſun is vertical.—Cold and hot (ſays our author) are terms merely relative, not determined by the latitude, but elevation of the place. When, therefore, we ſay *hot*, ſome other explanation is neceſſary concerning the place where we are, in order to give an adequate idea of the ſenſations of that heat upon the body, and the effects of it upon the lungs. The degree of the thermometer conveys this but very imperfectly; 90 degrees is exceſſively hot at Loheia in Arabia Felix; and yet the latitude of Loheia is but 15 degrees; whereas 90 degrees at Sennaar is only warm as to ſenſe; though Sennaar, as we have already ſaid, is in latitude 13 degrees.

"At Sennaar, then, I call it *cold*, when one fully clothed and at reſt feels himſelf in want of fire. I call it *cool*, when one fully clothed and at reſt feels he could bear more covering all over, or in part, than he has at that time. I call it *temperate*, when a man ſo clothed, and at reſt, feels no ſuch want, and can take moderate exerciſe, ſuch as walking about a room without ſweating. I call it *warm*, when a man, ſo clothed, does not ſweat when at reſt; but, on taking moderate exerciſe, ſweats, and again cools. I call it *hot*, when a man at reſt, or with moderate exerciſe, ſweats exceſſively. I call it *very hot*, when a man with thin, or little clothing, ſweats much, though at reſt. I call it *exceſſive hot*, when a man, in his ſhirt and at reſt, ſweats exceſſively, when all motion is painful, and the knees feel feeble, as if after a fever. I call it *extreme hot*, when the ſtrength fails, a diſpoſition to faint comes on, a ſtraitneſs is found in the temples, as if a ſmall cord was drawn tight about the head, the voice impaired, the ſkin dry, and the head ſeems more than ordinarily large and light. This, I apprehend, denotes death at hand; but this is rarely if ever effected by the ſun alone, without the addition of that poiſonous wind which purſued us through Atbara, where it has, no doubt, contributed to the total extinction of every thing that hath the breath of life. A thermometer, graduated upon this ſcale, would exhibit a figure very different from the common one; for I am convinced by experiment, that a web of the fineſt muſlin, wrapt round the body at Sennaar, will occaſion at mid-day a greater ſenſation of heat in the body, than a riſe of 5 degrees in the thermometer of Fahrenheit. Sennaar.

"At Sennaar, from 70 to 78 degrees of Fahrenheit's thermometer is cool; from 79 to 92 temperate; at 92 degrees begins warmth. Although the degree of the thermometer marks a greater heat than is felt by the body of us ſtrangers, it ſeems to me that the ſenſations of the natives bear ſtill a leſs proportion to that degree than ours. On the 2d of Auguſt, while I was lying perfectly enervated on a carpet in a room deluged with water at 12 o'clock, the thermometer at 116, I ſaw ſeveral black labourers pulling down a houſe, working with great vigour, without any ſymptoms of being incommoded."

The dreſs of the people of Sennaar conſiſts only of a long ſhirt of blue cloth, which wraps them up from the under part of the neck to the feet. It does not, however, conceal the neck in the men, though it does in the women. The men ſometimes have a ſaſh tied about their middle; and both men and women go barefooted in the houſes, whatever their rank may be. The floors of their apartments, eſpecially thoſe of the women, are covered with Perſian carpets. Both men and women anoint themſelves, at leaſt once a-day, with camel's greaſe mixed with civet, which, they imagine, ſoftens their ſkins, and preſerves them from cutaneous eruptions; of which they are ſo fearful, that they confine themſelves to the houſe if they obſerve the ſmalleſt pimple on their ſkins. With the ſame view of preſerving their ſkins, though they have a clean ſhirt every day, they ſleep with a greaſed one at night, having no other covering but this. Their bed is a tanned bull's hide, which this conſtant greaſing ſoftens very much; it is alſo very cool, though it gives a ſmell to their bodies from which they cannot be freed by any waſhing.

Our author gives a very curious deſcription of the queens and ladies of the court at Sennaar. He had acceſs to them as a phyſician, and was permitted to pay his viſit alone. He was firſt ſhown into a large ſquare apartment, where there were about 50 black women, all quite naked excepting a very narrow piece of cotton rag about their waiſts. As he was muſing whether theſe were all queens, one of them took him by the hand, and led him into another apartment much better lighted than the former. Here he ſaw three women ſitting upon a bench or ſofa covered with blue Surat cloth; they themſelves being clothed from the neck to the feet with cotton ſhirts of the ſame colour. Theſe were three of the king's wives; his favourite, who was one of the number, appeared to be about ſix feet high, and ſo corpulent that our traveller imagined her to be the largeſt creature he had ſeen next to the elephant and rhinoceros. Her features perfectly reſembled thoſe of a negro: a ring of gold paſſed through her under lip, and weighed it down, till, like a flap, it covered her chin, leaving her teeth bare, which were ſmall and very fine. The inſide of her lip was made black with antimony. Her ears reached down to her ſhoulders, and had the appearance of wings: there was a gold ring in each of them about five inches in diameter, and ſomewhat ſmaller than a man's little finger; the weight of which had drawn down the hole where her ear was pierced

Sennaar || Senones.

pierced ſo much that three fingers might eaſily paſs above the ring. She had a gold necklace like that called *Eſclavage*, of ſeveral rows, one below another; to which were hung rows of ſequins pierced. She had two manacles of gold upon her ancles larger than thoſe uſed for chaining felons. Our author could not imagine how it was poſſible for her to walk with them, till he was informed that they were hollow. The others were dreſſed much in the ſame manner; only there was one who had chains coming from her ears to the outſide of each noſtril, where they were faſtened. A ring was alſo put through the griſtle of her noſe, and which hung down to the opening of her mouth; having all together ſomething of the appearance of a horſe's bridle; and Mr Bruce thinks that ſhe muſt have breathed with difficulty.

The poorer ſort of the people of Sennaar live on the flour or bread of millet; the rich make puddings of this, toaſting the flour before the fire, and putting milk and butter into it; beſides which they uſe beef partly roaſted and partly raw. They have very fine and fat horned cattle, but the meat commonly ſold in the market is camel's fleſh. The liver and ſpare rib of this animal are always eaten raw; nor did our author ſee one inſtance to the contrary all the time he was in the country. Hog's fleſh is not ſold in the market; but all the common people of Sennaar eat it openly; thoſe in office, who pretend to be Mahometans, doing the ſame in ſecret.

There are no manufactures in this country, and the principal article of trade is blue Surat cloth. In former times, when caravans could paſs with ſafety, Indian goods were brought in quantities from Jidda to Sennaar, and then diſperſed over the country of the blacks. The returns were made in gold, a powder called *tibbar*, civet, rhinoceroſes horns, ivory, oſtrich feathers, and above all ſlaves or glaſs, more of theſe being exported from Sennaar than from all the eaſt of Africa. This trade, however, as well as that of the gold and ivory, is almoſt deſtroyed; though the gold is ſtill reputed to be the beſt and pureſt in Africa, and is therefore bought at Mocha to be carried to India, where it all centres at laſt.

SENNERTUS, DANIEL, an eminent phyſician, was born in 1572 at Breſlaw; and in 1593 he was ſent to Wittemberg, where he made great progreſs in philoſophy and phyſic. He viſited the univerſities of Leipſic, Jena, Francfort on the Oder, and Berlin; but ſoon returned to Wittemberg, where he was promoted to the degree of doctor of phyſic, and ſoon after to a profeſſorſhip in the ſame faculty. He was the firſt who introduced the ſtudy of chemiſtry into that univerſity; he gained a great reputation by his works and practice, and was very generous to the poor. He died of the plague at Wittemberg, in 1637. He raiſed himſelf enemies by contradicting the ancients. He thought the ſeed of all living creatures animated, and that the ſoul of this ſeed produces organization. He was accuſed of impiety for aſſerting that the ſouls of beaſts are not material; for this was affirmed to be the ſame thing with aſſerting that they are immortal; but he rejected this conſequence, as he well might do. See METAPHYSICS, Part III. chap. vi.

SENONES, in *Ancient Geography*, a people of Gallia Celtica, ſituated on the Sequana to the ſouth of the Pariſii, near the confluence of the Jeauna or Yonne with the above mentioned river. Their moſt conſiderable exploit was their invaſion of Italy, and taking and burning ROME, as related under that article. This was done by a colony of them long before tranſported into Italy, and ſettled on the Adriatic. Their capital, Agendicum in Gaul, was in the lower age called *Senones*, now *Sens*. In Italy the Senones extended themſelves as far as the river Aeſis; but were afterwards driven beyond the Rubicon, which became the boundary of Gallia Ciſalpina, (Polybius, Strabo.)

Senones || Senſe.

SENSATION, in *Philoſophy*, the perception of external objects by means of the ſenſes. See METAPHYSICS, Part I. chap. i.

SENSE, a faculty of the ſoul whereby it perceives external objects by means of the impreſſions they make on certain organs of the body. See METAPHYSICS, Part I. and ANATOMY, N° 137, &c.

Common SENSE, is a term that has been variouſly uſed both by ancient and modern writers. With ſome it has been ſynonymous with public ſenſe; with others it has denoted prudence; in certain inſtances, it has been confounded with ſome of the powers of taſte; and, accordingly, thoſe who commit egregious blunders with regard to decorum, ſaying and doing what is offenſive to their company, and inconſiſtent with their own character, have been charged with a defect in common ſenſe. Some men are diſtinguiſhed by an uncommon acuteneſs in diſcovering the characters of others; and this talent has been ſometimes called *common ſenſe*; ſimilar to which is that uſe of the term, which makes it to ſignify that experience and knowledge of life which is acquired by living in ſociety. To this meaning Quintilian refers, ſpeaking of the advantages of a public education: *Senſum ipſum qui communis dicitur, ubi diſcet, cum ſe à congreſſu, qui non hominibus ſolum, ſed mutis quoque animalibus naturalis eſt, ſegregarit?* Lib. i. cap. 2.

But the term *common ſenſe* hath in modern times been uſed to ſignify that power of the mind which perceives truth, or commands belief, not by progreſſive argumentation, but by an inſtantaneous, inſtinctive, and irreſiſtible impulſe; derived neither from education nor from habit, but from nature; acting independently of our will, whenever its object is preſented, according to an eſtabliſhed law, and therefore called *ſenſe*; and acting in a ſimilar manner upon all, or at leaſt upon a great majority of mankind, and therefore called *common ſenſe*. See METAPHYSICS, N° 127.

Moral SENSE, is a determination of the mind to be pleaſed with the contemplation of thoſe affections, actions, or characters, of rational agents, which we call *good* or *virtuous*.

This moral ſenſe of beauty in actions and affections may appear ſtrange at firſt view; ſome of our moraliſts themſelves are offended at it in Lord Shafteſbury, as being accuſtomed to deduce every approbation or averſion from rational views of intereſt. It is certain that his Lordſhip has carried the influence of the moral ſenſe very far, and ſome of his followers have carried it farther. The advocates for the ſelfiſh ſyſtem ſeem to drive their opinions to the oppoſite extreme, and we have elſewhere endeavoured to ſhow that the truth lies between the contending parties. See MORAL PHILOSOPHY, N° 27—32.

Senſes. *Public* SENSE is defined by the noble author of the Characteriſtics to be an innate propenſity to be pleaſed with the happineſs of others, and to be uneaſy at their miſery. It is found, he ſays, in a greater or leſs degree in all men, and was ſometimes called κοινονομια, or *ſenſus communis*, by ancient writers.

Of the reality of this public ſenſe we have great doubts. The conduct of ſavages, who are more under the influence of original inſtinct than civilized men, gives no countenance to it. Their affections ſeem all to be ſelfiſh, or at leaſt to ſpring from ſelf-love variouſly modified. For the happineſs of their wives they have very little regard, conſidering them merely as inſtruments of their own pleaſure, and valuing them for nothing elſe. Hence they make them toil, while they themſelves indulge in liſtleſs idleneſs. To their children we believe they exhibit ſtrong ſymptoms of attachment, as ſoon as they derive aſſiſtance from them in war, or in the buſineſs of the chace; but during the helpleſs years of infancy, the child is left by the ſelfiſh father wholly to the care and protection of its wretched mother; who, impelled by the *ſtorge* of all females to their young, cheriſhes her offſpring with great fondneſs.—The ſavage is, indeed, ſuſceptible of ſtrong attachments, ſimilar to that which we call friendſhip; but ſuch attachments are no proofs of diſintereſted benevolence, or what his Lordſhip calls the *public ſenſe*. Two barbarous heroes are probably firſt linked together by the obſervation of each other's proweſs in war, or their ſkill in purſuing their game; for ſuch obſervation cannot fail to ſhow them that they may be uſeful to one another; and we have elſewhere ſhown how real friendſhip may ſpring from ſentiments originally ſelfiſh. The ſavage is very much attached to his horde or tribe, and this attachment reſembles patriotiſm: but patriotiſm itſelf is not a ſentiment of pure benevolence delighting in the happineſs of others, and grieving at their miſery; for the patriot prefers his own country to all others, and is not very ſcrupulous with reſpect to the rectitude of the means by which he promotes its intereſt, or depreſſes its rivals. The ſavage purſues with relentleſs rigour the enemies of himſelf or of the tribe to which he belongs; ſhows no mercy to them when in his power, but puts them to the cruelleſt death, and carries their ſcalps to the leader of his party. Theſe facts, which cannot be controverted, are perfectly irreconcilcable with innate benevolence, or a public ſenſe comprehending the whole race of men; and ſhew the truth of that theory by which we have in another place endeavoured to account for all the paſſions, ſocial as well as ſelfiſh. See PASSION.

SENSES, PLEASURES AND PAINS OF. The natural agreeableneſs, diſagreeableneſs and indifference of our ſenſations and perceptions, preſent to the mind an important and extenſive field of inquiry; and on this ſubject we ſhall here make a few obſervations. All our ſenſes have been certainly beſtowed upon us for wiſe and beneficent purpoſes; and, accordingly, we find, that all of them, when properly cultivated, or exerciſed and improved, are capable of affording us much pleaſure. The ſenſes of ſmell and of taſte ſeem rather intended for the preſervation of our animal exiſtence, and in this point of view are properly an object of the natural hiſtory of man; whilſt the other three ſeem to be more peculiarly intended for our mental improvement, and accordingly form an object of intellectual and of moral philoſophy. And agreeably to this we know that we derive a great deal of very uſeful knowledge, in an eaſy and ſimple manner, concerning the objects that ſurround us, in the early part of life, from all the ſenſes, particularly from ſight and touch, and this too without labour or ſtudy. But this is not the only purpoſe for which the ſenſes were deſigned. Senſes.

It being thus certain, that the ſenſes were beſtowed upon us partly to preſerve our animal exiſtence, and partly for our mental improvement, it ſeems reaſonable, even *à priori*, to expect that nature would attach ſome pleaſure to ſuch uſe and exerciſe of them, as are calculated to promote theſe ends, and pain to the contrary; particularly in thoſe inſtances in which ſhe has left the management of them ſubject to our own controul. And accordingly we cannot but obſerve what delight we derive from our ſenſes, eſpecially in the morning of life, by which it would ſeem, that nature intended thus winningly to invite us to the proper exerciſe and improvement of them; and as it were unconſciouſly, acquire much uſeful knowledge. It is this ſpecies of pleaſure that ſupports and excites boys in the conſtant and often immoderate exerciſe of their organs of voluntary motion; the powers of which are thus increaſed and invigorated.

The exerciſe and improvement of the ſenſes being ſubſervient to our intellectual improvement, nature has alſo kindly attached much refined and rational pleaſure to the mental exertions; ſo that we are thus ſeduced, as it were, to the cultivation of the various extraordinary powers and faculties of the mind.

It is evident that nature has given ſuch organs and faculties to man, as are calculated not only to make him live, but alſo to render life agreeable. Here too we obtain a ſlight glimpſe at leaſt of ſome of the final cauſes of the pleaſures of ſenſe. But if it be aſked how it happens, that there are ſuch wide diverſities between our ſenſations, ſome being by nature very agreeable to all men, and ſome as diſagreeable, whilſt there are others ſo indifferent, as to give neither pleaſure nor pain, we muſt confeſs, that we can give no ſatisfactory anſwer, to ſhew how ſo many very different ſenſations are produced by various kinds of impreſſions made on certain organs of the body, and how all theſe different impreſſions excite ſuch ſenſations as ſuggeſt not only correſponding perceptions and external qualities, but at the ſame time affect the mind with pleaſure, pain, trouble, anxiety, or diſguſt. To be ſucceſsful in theſe inquiries, we muſt preſuppoſe ſome knowledge of the nature of the connection ſubſiſting between the mind and body, which there is reaſon to think is placed beyond the limits preſcribed by nature to human reſearch.

The pleaſure or pain which conſtantly attends certain ſenſations is not uniform in degree, but varies conſiderably, not only in different individuals, but even in the ſame perſons at different times. It is not thus with the ſenſations themſelves. Theſe are always conſtant and uniform. The ſame kind of impreſſion, when the organs &c. are ſound, uniformly and invariably produce ſimilar ſenſations; and theſe are as invariably followed by the perception of their own peculiar exciting cauſes. For any particular impreſſion is never known to excite in the ſame perſon a new ſenſation, or the perception of an external object different from that which it previouſly ſuggeſted,

Senſes. ſuggeſted, excepting in caſes of diſeaſe. And when it does rarely occur, as in thoſe who cannot diſtinguiſh a particular colour, ſmell or taſte, from certain others, we uniformly attribute it to diſeaſe or malconformation. Were we not thus to have uniformly ſimilar ſenſations and perceptions of external objects from ſimilar impreſſions, the ſenſes would not be at all ſubſervient to our intellectual improvement; ſince, by giving different leſſons concerning the ſame or ſimilar objects at different times, they would render it impoſſible for us to be certain of any thing, or to benefit by experience.

The effects of cuſtom, which are at all times ſo conſiderable and evident with reſpect both to the mind and body, (as in the caſe of particular organs or faculties much improved by attention and exerciſe,) have little or no influence at all in interrupting or modifying this uniformity in our ſenſations and perceptions. For no ſound, or properly organized perſon will, either naturally or by cuſtom, ever miſtake hardneſs for ſoftneſs, red for green, or ſweet for bitter. But the influence of cuſtom in modifying the pains and pleaſures of ſenſe is well known and conſiderable. For a perſon, who can moſt accurately diſtinguiſh ſweetneſs from ſourneſs, will at the ſame time, either by particular conformation, or more frequently in conſequence of uſe and habit, prefer wormwood or tobacco to honey.

But although we may deſpair of being ever able to diſcover the phyſical cauſe of the pleaſures and pains of the ſenſes, we may, however, advance a little by obſerving and regiſtering particular facts. It is, accordingly, of uſe to remark, that every ſpecies of ſenſation, if its nature be otherwiſe unchanged, is agreeable or diſagreeable in proportion to its ſtrength or intenſeneſs. For there is no ſenſation, however agreeable, that will not become diſagreeable, and even intolerable, if it be immoderately intenſe. Whilſt on the contrary, thoſe, which by their ſtrength and nature are very troubleſome, if rendered more mild and moderate become not only tolerable, but agreeable. Thus, with reſpect to the ſenſes it would ſeem, that pain and pleaſure are only different degrees of the ſame feeling, and when we conſider the great varieties of which the ſenſation, not only of different organs, but even of any one of them, is ſuſceptible, and that each degree of theſe may be accompanied with pleaſure or pain, more or leſs, we muſt conclude that the pains and pleaſures of ſenſe are capable of numberleſs modifications both in degree and in kind.

We frequently obſerve, that ſenſations which were at firſt agreeable, if often repeated, loſe their reliſh, though the nature and ſtrength of the impreſſions be the ſame; whilſt others from being at firſt very diſagreeable, as the taſte of tobacco and opium, become very pleaſing, though the nature and ſtrength of the impreſſions have ſuffered no change. For the explanation of ſuch facts as theſe we muſt have recourſe to the effects of cuſtom. Thus, in both theſe oppoſite caſes, the ſenſations from being often repeated, loſe part of the ſtrength, and of the novelty, of courſe, of their firſt impreſſions; and, with reſpect to the former inſtance, being unable to command the attention, become in the courſe of time almoſt wholly, or altogether neglected, whilſt in the latter caſe, from being very offenſive, they become highly agreeable. But if it be aſked why habit and cuſtom produce theſe effects, and in what manner, we are unable to explain it farther, than by ſaying, ſince the fact is unqueſtionable, that ſuch is the nature of the human conſtitution. Of the effects themſelves, no man can entertain a doubt; and their cauſes, though at preſent unknown, may by time and inquiry be further developed and ſimplified. "The labyrinth," ſays Dr Reid, "may be too intricate, and the thread too fine, to be traced through all its windings; but if we ſtop where we can trace it no farther, and ſecure the ground we have gained, there is no harm done; a quicker eye may in time trace it further." Senſes.

Theſe principles are capable of affording us ſtill farther explanations. Why are new ſenſations always more agreeable and variety ſo pleaſing? Becauſe they fix the attention more, and are not as yet blunted by frequent repetition or by habit. It is becauſe ſome ſenſations loſe their wonted effects by cuſtom and by repetition, that we require ſtronger ones, or at leaſt ſtronger impreſſions on the organs and nerves, to increaſe or continue our pleaſures. It is alſo in conſequence of their becoming leſs poignant through habit that we neglect ſo many pleaſures, which we hardly know to be ſuch, till they have flown for ever; and it is becauſe in the morning of life every thing has more novelty, and becauſe habit has not deſtroyed their reliſh, that the pleaſures of youth are much more intenſe than thoſe of age. The degree of pleaſure is ſimilar to that which a blind man would feel on being made to ſee, or to that which a man would enjoy on ſuddenly acquiring a new ſenſitive faculty, although by long uſe and habit theſe pleaſures are at preſent for the moſt part or wholly blotted away.

Although moſt ſenſations, when ſtrong and lively enough to make themſelves accurately and eaſily diſtinguiſhed, generally pleaſe moſt, each in its own kind and manner; ſtill, as there are different kinds of pleaſure, different ſenſations may pleaſe the mind in various ways; and accordingly, it is not from the luſtre of the midday ſun, nor from the beautiful and lively appearance of all nature at noon, ſolely that the eyes derive pleaſure, any more than grand muſical ſounds are the only things that pleaſe the ear. For we often contemplate with a very different and a very conſiderable degree of pleaſure the ſublime and awful ſcenes of nature, the twilight darkneſs of the ſhady grove, and even the gloomy horror of night itſelf. We liſten with delight to the tempeſt ſhaking the foreſt, as well as to the gentle murmurs of the paſſing ſtream. There is even a time when nothing gives ſo much pleaſure as darkneſs, ſilence, and the abſence of all ſenſation.

Amidſt the great variety of good and evil with which we are every where ſurrounded, it is a matter of the higheſt importance to be able to diſcern aright. This we ſhould be incapable of doing were we not endowed with agreeable as well as painful ſenſations. Theſe ſerve to direct our choice. Whatever contributes in any degree to our preſervation and to the improvement of our organs and faculties, is accompanied with pleaſure; and on the contrary, when we are threatened with danger a painful ſenſation gives us the alarm. It is to the eſtabliſhment of this law that we are indebted for the duration of our lives, the improved and vigorous ſtate of our faculties, and the enjoyment of that ſmall portion of happineſs allotted to us by nature. "God, (ſays a French writer) having endowed man with various faculties, bodily as well as intellectual, in order to promote his happineſs,

Senſes. pineſs, alſo vouchſafes to conduct him to this noble end, not only by the deductions of reaſon, but alſo by the force of inſtinct and ſenſation, which are more powerful and efficacious principles. Thus nature, by a ſenſation of pain, inſtantaneouſly appriſes us of what might prove hurtful to us; and, on the contrary, by an agreeable ſenſation, gently leads us to whatever may tend to the preſervation of our exiſtence, and to the perfect ſtate of our faculties, theſe being the two points on which our happineſs depends. Our faculties can neither be of uſe, nor diſplay themſelves farther than as we exerciſe them; motion or action is therefore ſo neceſſary to us, that without it we muſt inevitably ſink into a deplorable ſtate of inſenſibility and languor. On the other hand, as we are weak and limited creatures, all exceſſive and violent action would impair and deſtroy our organs; we muſt therefore uſe only moderate motion or exerciſe, ſince by theſe means the uſe or perfection of our faculties is reconciled with our chief intereſt, which is ſelf-preſervation. Now it is to this happy medium, I mean to a moderate exerciſe of our faculties that the author of our nature has ſo wiſely annexed pleaſure.

The pleaſures of ſenſe are thus confined within narrow limits; for they cannot be much increaſed without pain, or often repeated without loſing their reliſh, at leaſt in a great meaſure; nor can they be long continued, partly for the ſame reaſon, and becauſe they exhauſt the mind, or rather the nervous ſyſtem. Hence we ſee that our animal appetites are confined within a narrow range, as is evident from the effects of exceſs in eating and drinking. All our ſenſitive powers are impaired; whilſt, on the contrary, our intellectual powers are ſtrengthened and improved by uſe and exerciſe. And in proportion as we indulge our ſenſitive powers, our deſires of indulgence increaſe, whilſt the pleaſures, which are the objects of theſe deſires, become regularly leſs poignant. Theſe, indeed, are wiſe regulations of nature; for it would ſeem as if ſhe intended to whiſper gently to us in this way, by means of practical experience, that we are not born ſolely for the enjoyment of pleaſure, at leaſt not for that of the pleaſures of the ſenſes; for all of them, as we have already remarked, if much indulged, lead to liſtleſsneſs and diſguſt, and ſometimes to conſiderable pain. And indeed, juſt as pleaſure paſſes thus readily into trouble and pain, ſo does the ſudden ceſſation of pain, at leaſt when this has been conſiderable, produce often extraordinary pleaſure. So that we may here apply the beautiful allegory of the divine Socrates, "that although pleaſure and pain are contrary in their nature, and have their faces turned different ways, yet that Jupiter hath tied them ſo together, that he who lays hold of the one draws the other along with it."

We have juſt ſaid, that the *ſudden* ceſſation of pain, at leaſt when this has been conſiderable, produces often extraordinary pleaſure. But this opinion ſeems to be denied in a late inquiry concerning taſte. "Among the pleaſures of ſenſe," ſays Mr Knight, "more particularly among thoſe belonging to touch, there is a certain claſs, which, though ariſing from negative cauſes, are nevertheleſs real and poſitive pleaſures: as when we gradually ſink from any violent or exceſſive degree of action or irritation into a ſtate of tranquillity and repoſe. I ſay *gradually*; for if the tranſition be ſudden and abrupt, it will not be pleaſant; the pleaſure ariſing from the inverted action of the nerves, and not from the utter ceſſation of action. From this inverted action ariſes the gratification which we receive from a cool breeze, when the body has been exceſſively heated; or from the rocking of a cradle, or the gentle motion of a boat, or eaſy carriage, after having been fatigued with violent exerciſe. Such, too, is that which twilight, or the gloomy ſhade of a thicket, affords to the eye after it has been dazzled by the blaze of the mid-day ſun; and ſuch, likewiſe, is that which the ear receives from the gradual diminution of loudneſs of tone in muſic." That pleaſure follows a gradual ceſſation of any violent action or irritation, we mean not to deny; but we are at a loſs to comprehend how it follows, that the tranſition from ſtrong pain, if it be ſudden and abrupt, will not be pleaſant. Senſes.

But although the pleaſures of ſenſe be thus limited, theſe limits are very different with reſpect to the different ſenſes. Some of them are ſoon exhauſted, and do not any longer diſtinguiſh well the objects that correſpond to them; nor are they pleaſed with thoſe objects which were at firſt very agreeable, and which they diſtinguiſh with ſufficient accuracy; whilſt others continue to perform their functions longer, and enjoy a more continued pleaſure. Thus the ſenſes of ſmell and of taſte are almoſt immediately ſatiated; the ſenſe of hearing more ſlowly; but the ſight is in this reſpect the laſt of all to be fatigued or ſatiated: whilſt the pleaſures that ariſe from the exerciſe of our mental faculties are by far the moſt durable of all. "Exerciſe of the mind is as neceſſary as that of the body to preſerve our exiſtence. The ſenſes of other animals, being more quick than ours, are ſufficient to direct them to follow what is agreeable to their nature, or to ſhun whatever is contrary thereto. But we are endowed with reaſon in order to ſupply the deficiency of our ſenſes; and pleaſure preſents herſelf as an incitement to exerciſe, in order to keep the mind from a ſtate of hurtful inactivity. Pleaſure is not only the parent of ſports and amuſements, but alſo of arts and ſciences: and as the whole univerſe is, as it were, forced by our induſtry to pay tribute to our wants and deſires, we cannot but acknowledge our obligation to that law of nature, which has annexed a degree of pleaſure to whatever exerciſes without fatiguing the mind. The pleaſure accompanying it is ſometimes ſo great that it tranſports the very ſoul, ſo that ſhe ſeems as it were diſengaged from the body. We know what is recorded in hiſtory concerning Archimedes (A), and ſeveral other geometricians both ancient and modern. If we

(A) When Syracuſe was taken by the Romans under Marcellus, Archimedes was in his ſtudy, ſo intent upon ſome geometrical problems, that he neither heard the clamour of the Romans, nor perceived that the city was taken. In this tranſport of ſtudy and contemplation a ſoldier came on him with his drawn ſword; Archimedes, on ſeeing him, beſought him to hold his hand till he had finiſhed the problem he was about. But the ſoldier, deaf to his intreaty, ran him through the body, although Marcellus, upon entering the city, had given orders that Archimedes ſhould be ſpared.

Senſes.

we doubt the truths of ſuch facts, we muſt at leaſt acknowlege their probability, ſince we meet every day with a number of ſimilar examples. When we ſee a cheſs-player ſo deeply immerſed in thought as to be in a manner loſt to his outward ſenſes, ſhould we not imagine him to be wholly engroſſed with the care of his own private affairs, or of the public weal? but the object of all this profound meditation is the pleaſure of exerciſing the mind by the movement of a piece of ivory. From this exerciſe of the mind alſo ariſes the pleaſure we ſometimes take in refined and delicate ſentiments, which, after the manner of Virgil's ſhepherdeſs, (*Et fugit ad ſalices, ſed ſe cupit ante videri*), are ſometimes artfully concealed, but ſo as to afford us the pleaſure of diſcovering them *."

* *Theorie des Sentiments agréables.*

From ſome of the foregoing remarks we alſo ſee that nature points out to us the ſuperiority and excellence of our mental faculties, thus ſuggeſting to us that we ought to cultivate them moſt, as being our better and our nobler part, to the cultivation of which that of our ſenſitive faculties ſhould be merely ſubſervient. But, although our pleaſures are thus by nature rendered in a great degree independent of ourſelves, ſtill we have it in our power to make them all more durable, by varying and mixing them with one another, or by interpoſing between thoſe that are very agreeable others that are leſs pleaſing, ſo as that no individual pleaſure ſhall be in exceſs.

Beſides the circumſtances already noticed, there are others of a very different kind, which have alſo conſiderable influence on the pleaſures of the ſenſes; ſuch as different conditions of the whole body, particularly of the nerves, or of certain organs or functions, to which functions ſome organs of ſenſe, and perhaps even the ſenſation of theſe, are in a great meaſure ſubſervient. This is one of the cauſes why many pleaſures, which we cultivate with all our might, cannot be immortal. If a perſon be thirſty, ſpring water is nectar to him; if hungry, any kind of food is agreeable, even the ſmell of food is grateful. To a man in a heat, or in a fever, cold is pleaſing; and to one in a cold fit nothing is ſo agreeable as heat. To theſe ſame perſons, at other times, ſo far are theſe things from being agreeable, that they are often diſguſting. The moſt decided glutton cannot always reliſh a ſumptuous feaſt.

Beſides the ſenſations excited by external objects, there are others alſo which cauſe pain and pleaſure. If the action of the muſcles be ſtrong, eaſy, and cheerful, and not continued ſo as to fatigue us, it cauſes pleaſure. On the contrary, when this action is attended with a ſenſe of liſtleſſneſs, laſſitude, difficulty, and debility, it cauſes pain more or leſs. In fine, various ſtates and affections of the mind, ſuch as the exerciſe of memory, imagination, and judgement, nearly for ſimilar reaſons, are ſometimes painful, at other times agreeable. "Animi affectus, qui modici grate excitant, vehementes, aut graves et diuturni, hujus pariter ac corporis vires frangunt; hominem interdum ſtatim extinguunt, ſæpius longa valetudine macerant. Somni etiam, quo ad exhauſtas vires reficiendas egemus, exceſſus, vel defectus, et animo et corpori nocet."—"Deſidia, ſive animi ſive corporis, utriuſque vires langueſcunt: nimia exercitatione haud minus læduntur. Statuit enim provida rerum parens, ut ſingularum partium, et univerſi corporis animique vires uſu roborentur et acuantur; et huic iterum certos fines poſuit: ita ut neque quem voluit natura uſus impune omittatur, neque ultra modum intendatur *."

Senſes.

* *Conſpect. Medicin.*

"Of ſuch ſenſations and feelings as are agreeable or diſagreeable, we may remark," ſays Dr Reid, "that they differ much, not only in degree, but in kind and in dignity. Some belong to the animal part of our nature, and are common to us with the brutes: others belong to the rational and moral part. The firſt are more properly called *ſenſations*, the laſt *feelings*. The French word *ſentiment* is common to both."

"The Author of nature, in the diſtribution of agreeable and painful feelings, hath wiſely and benevolently conſulted the good of the human ſpecies; and hath even ſhewn us, by the ſame means, what tenor of conduct we ought to hold. For, *firſt*, The painful ſenſations of the animal kind are admonitions to avoid what would hurt us; and the agreeable ſenſations of this kind invite us to thoſe actions that are neceſſary to the preſervation of the individual, or of the kind. *Secondly*, By the ſame means nature invites us to moderate bodily exerciſe, and admoniſhes us to avoid idleneſs and inactivity on the one hand, and exceſſive labour and fatigue upon the other. *Thirdly*, The moderate exerciſe of all our rational powers gives pleaſure. *Fourthly*, Every ſpecies of beauty is beheld with pleaſure, and every ſpecies of deformity with diſguſt; and we ſhall find all that we call beautiful, to be ſomething eſtimable, or uſeful in itſelf, or a ſign of ſomething that is eſtimable or uſeful. *Fifthly*, The benevolent affections are all accompanied with an agreeable feeling, the malevolent with the contrary. And, *Sixthly*, The higheſt, the nobleſt and moſt durable pleaſure is that of doing well and acting the part that becomes us; and the moſt bitter and painful ſentiment is the anguiſh and remorſe of a guilty conſcience." Theſe obſervations with regard to the economy of nature in the diſtribution of our painful and agreeable ſenſations and feelings are ſo well illuſtrated by the elegant and judicious author of *Theorie des Sentiments agreables*, that we deem it unneceſſary to make any further remarks on this ſubject. (See HAPPINESS and PLEASURE.) A little reflection may ſatisfy us, that the number and variety of our ſenſations and feelings are prodigious. For, to omit all thoſe which accompany our appetites, paſſions, and affections, our moral ſentiments and ſentiments of taſte, even our external ſenſes, furniſh a great variety of ſenſations differing in kind, and almoſt in every kind an endleſs variety of degrees. Every variety we diſcern, with regard to taſte, ſmell, ſound, colour, heat, and cold, and in the tangible qualities of bodies, is indicated by a ſenſation correſponding to it.

The moſt general and the moſt important diviſion of our ſenſations and feelings is into the agreeable, the diſagreeable, and the indifferent. Every thing we call pleaſure, happineſs, or enjoyment, on the one hand; and, on the other, every thing we call miſery, pain, or uneaſineſs, is ſenſation or feeling: For no man can for the preſent be more happy, or more miſerable, than he feels himſelf to be. He cannot be deceived with regard to the enjoyment or ſuffering of the preſent moment.

But, beſides the ſenſations that are agreeable or diſagreeable, there is ſtill a greater number that are indifferent. To theſe we give ſo little attention, that they have no name, and are immediately forgotten as if they had

Senſes ‖ Senſibility.

had never been; it even requires attention to the operations of our minds to be convinced of their exiſtence. For this end we may obſerve, that to a good ear every human voice is diſtinguiſhable from all others. Some voices are pleaſant, ſome diſagreeable; but the far greater part cannot be ſaid to be one or the other. The ſame thing may be ſaid of other ſounds, and no leſs of taſtes, ſmells, and colours; and if we conſider, that our ſenſes are in continual exerciſe while we are awake, that ſome ſenſation attends every object they preſent to us, and that familiar objects ſeldom raiſe any emotion pleaſant or painful; we ſhall ſee reaſon, beſides the agreeable and diſagreeable, to admit a third claſs of ſenſations, that may be called indifferent. But theſe ſenſations that are indifferent are far from being uſeleſs. They ſerve as ſigns to diſtinguiſh things that differ; and the information we have concerning things external comes by theſe means. Thus, if a man had not a muſical ear ſo as to receive pleaſure from the harmony or melody of ſounds, he would ſtill find the ſenſe of hearing of great utility. Though ſounds gave him neither pleaſure nor pain, of themſelves, they would give him much uſeful information; and the ſame may be ſaid of the ſenſations we have by all the other ſenſes.

SENSIBLE NOTE, in *Muſic*, is that which conſtitutes a third major above the dominant, and a ſemitone beneath the tonic. *Si*, or B, is the ſenſible note in the tone of *ut* or C *ſol* ♯; or G ſharp, in the tone of *la* or A.

They call it the *ſenſible note* on this account, that it cauſes to be perceived the tone or natural ſeries of the key and the tonic itſelf; upon which, after the chord of the dominant, the ſenſible note taking the ſhorteſt road, is under a neceſſity of riſing; which has made ſome authors treat this ſenſible note as a major diſſonance, for want of obſerving, that diſſonance, being a relation, cannot be conſtituted unleſs by two notes between which it ſubſiſts.

It is not meant that the ſenſible note is the ſeventh of the tone, becauſe, in the minor mode, this ſeventh cannot be a ſenſible note but in aſcending; for, in deſcending, it is at the diſtance of a full note from the tonic, and of a third minor from the dominant.

SENSIBILITY, is a nice and delicate perception of pleaſure or pain, beauty or deformity. It is very nearly allied to taſte; and, as far as it is natural, ſeems to depend upon the organization of the nervous ſyſtem. It is capable, however, of cultivation, and is experienced in a much higher degree in civilized than in ſavage nations, and among perſons liberally educated than among boors and illiterate mechanics. The man who has cultivated any of the fine arts has a much quicker and more exquiſite perception of beauty and deformity in the execution of that art, than another of equal or even greater natural powers, who has but caſually inſpected its productions. He who has been long accuſtomed to that decorum of manners which characterizes the polite part of the world, perceives almoſt inſtantaneouſly the ſmalleſt deviation from it, and feels himſelf almoſt as much hurt by behaviour harmleſs in itſelf, as by the groſſeſt rudeneſs; and the man who has long proceeded ſteadily in the paths of virtue, and often painted to himſelf the deformity of vice, and the miſeries of which it is productive, is more quickly alarmed at any deviation from rectitude, than another who, though his life has been ſtained by no crime, has yet thought leſs upon the principles of virtue and conſequences of vice. Senſibility.

Every thing which can be called ſenſibility, and is not born with man, may be reſolved into aſſociation, and is to be regulated accordingly; for ſenſibilities may be acquired which are inimical to happineſs and to the practice of virtue. The man is not to be envied who has ſo accuſtomed himſelf to the forms of polite addreſs as to be hurt by the unaffected language and manners of the honeſt peaſant, with whom he may have occaſion to tranſact buſineſs; nor is he likely to acquire much uſeful knowledge who has ſo ſedulouſly ſtudied the beauties of compoſition as to be unable to read without diſguſt a book of ſcience or of hiſtory, of which the ſtyle comes not up to his ſtandard of perfection. That ſenſibility which we either have from nature, or neceſſarily acquire, of the miſeries of others, is of the greateſt uſe when properly regulated, as it powerfully impels us to relieve their diſtreſs; but if it by any means become ſo exquiſite as to make us ſhun the ſight of miſery, it counteracts the end for which it was implanted in our nature, and only deprives us of happineſs, while it contributes nothing to the good of others. Indeed there is reaſon to believe that all ſuch extreme ſenſibilities are ſelfiſh affectations, employed as apologies for withholding from the miſerable that relief which it is in our power to give; for there is not a fact better eſtabliſhed in the ſcience of human nature, than that paſſive perceptions grow gradually weaker by repetition, while active habits daily acquire ſtrength.

It is of great importance to a literary man to cultivate his taſte, becauſe, it is the ſource of much elegant and refined pleaſure, (ſee TASTE); but there is a degree of faſtidiouſneſs which renders that pleaſure impoſſible to be obtained, and is the certain indication of expiring letters. It is neceſſary to ſubmit to the artificial rules of politeneſs, for they tend to promote the peace and harmony of ſociety, and are ſometimes a uſeful ſubſtitute for moral virtue; but he who with reſpect to them has ſo much ſenſibility as to be diſguſted with all whoſe manners are not equally poliſhed with his own, is a very troubleſome member of ſociety. It is every man's duty to cultivate his moral ſenſibilities, ſo as to make them ſubſervient to the purpoſes for which they were given to him; but if he either feel, or pretend to feel, the miſeries of others to ſo exquiſite a degree as to be unable to afford them the relief which they have a right to expect, his ſenſibilities are of no good tendency.

That the man of true ſenſibility has more pains and more pleaſures than the callous wretch, is univerſally admitted, as well as that his enjoyments and ſufferings are more exquiſite in their kinds; and as no man lives for himſelf alone, no man will acknowledge his want of ſenſibility, or expreſs a wiſh that his heart were callous. It is, however, a matter of ſome moment to diſtinguiſh real ſenſibilities from ridiculous affectations; thoſe which tend to increaſe the ſum of human happineſs from ſuch as have a contrary tendency; and to cultivate them all in ſuch a manner as to make them anſwer the ends for which they were implanted in us by the beneficent Author of nature. This can be done only by watching over them as over other aſſociations, (ſee METAPHYSICS, N° 98.); for exceſſive ſenſibility, as it is not the gift of nature, is the bane of human happineſs. "Too much tenderneſs (as Rouſſeau well obſerves) proves the bitter-

Senſitive. eſt curſe inſtead of the moſt fruitful bleſſing; vexation and diſappointment are its certain conſequences. The temperature of the air, the change of the ſeaſons, the brilliancy of the ſun, or thickneſs of the fogs, are ſo many moving ſprings to the unhappy poſſeſſor, and he becomes the wanton ſport of their arbitration."

SENSITIVE-PLANT, See MIMOSA, DIONÆA, and HEDYSARUM, BOTANY *Index*

The ſenſitive plants are well known to poſſeſs a kind of motion, by which the leaves and ſtalks are contracted and fall down on being ſlightly touched, or ſhaken with ſome degree of violence.

The contraction of the leaves and branches of the ſenſitive plant when touched, is a very ſingular phenomenon. Different hypotheſes have been formed by botaniſts in order to explain it; but we are diſpoſed to believe that theſe have generally been deduced rather from analogical reaſoning than from a collection of facts and obſervations. We ſhall therefore give an account of all the important facts which we have been able to collect upon this curious ſubject; and then draw ſuch concluſions as obviouſly reſult from them, without, however, attempting to ſupport any old, or to eſtabliſh a new, hypotheſis.

1. It is difficult to touch the leaf of a healthy ſenſitive plant ſo delicately that it will not immediately collapſe, the foliola or little leaves moving at their baſe till they come into contact, and then applying themſelves cloſe together. If the leaf be touched with a little more force, the oppoſite leaf will exhibit the ſame appearance. If a little more force be applied, the partial footſtalks bend down towards the common footſtalk from which they iſſue, making with it a more acute angle than before. If the touch be more violent ſtill, all the leaves ſituated on the ſame ſide with the one that has been touched will inſtantly collapſe, and the partial footſtalk will approach the common footſtalk to which it is attached, in the ſame manner as the partial footſtalk of the leaf approaches the ſtem or branch from which it iſſues; ſo that the whole plant, from having its branches extended, will immediately appear like a weeping birch.

2. Theſe motions of the plant are performed by means of three diſtinct and ſenſible articulations. The firſt, that of the foliola or lobes to the partial footſtalk; the ſecond, that of the partial footſtalk to the common one; the third, that of the common footſtalk to the trunk. The primary motion of all which is the cloſing of the leaf upon the partial footſtalk, which is performed in a ſimilar manner, and by a ſimilar articulation. This, however, is much leſs viſible than the others. Theſe motions are wholly independent on one another, as may be proved by experiment. It appears that if the partial footſtalks are moved, and collapſe toward the petioli, or theſe toward the trunk, the little leaves, whoſe motion is uſually primary to theſe, ſhould be affected alſo; yet experiment proves that it is poſſible to touch the footſtalks in ſuch a manner as to affect them only, and make them apply themſelves to the trunk, while the leaves feel nothing of the touch; but this cannot be, unleſs the footſtalks are ſo diſpoſed as that they can fall to the trunk, without ſuffering their leaves to touch any part of the plant in their paſſage, becauſe, if they do, they are immediately affected.

3. Winds and heavy rains make the leaves of the ſenſitive plant contract and cloſe; but no ſuch effect is Senſitive. produced from ſlight ſhowers.

4. At night, or when expoſed to much cold in the day, the leaves meet and cloſe in the ſame manner as when touched, folding their upper ſurfaces together, and in part over each other, like ſcales or tiles, ſo as to expoſe as little as poſſible of the upper ſurface to the air. The oppoſite ſides of the leaves (foliola) do not come cloſe together in the night, for when touched they apply themſelves cloſer together. Dr Darwin kept a ſenſitive plant in a dark place for ſome hours after day-break; the leaves and footſtalks were collapſed as in its moſt profound ſleep; and, on expoſing it to the light, above 20 minutes paſſed before it was expanded.

5. In the month of Auguſt, a ſenſitive plant was carried in a pot out of its uſual place into a dark cave, the motion that it received in the carriage ſhut up its leaves, and they did not open till 24 hours afterwards; at this time they became moderately open, but were afterwards ſubject to no changes at night or morning, but remained three days and nights with their leaves in the ſame moderately open ſtate. At the end of this time they were brought out again into the air, and there recovered their natural periodical motions, ſhutting every night, and opening every morning, as naturally and as ſtrongly as if the plant had not been in this forced ſtate; and while in the cave, it was obſerved to be very little leſs affected with the touch than when abroad in the open air.

6. The great heats of ſummer, when there is open ſunſhine at noon, affect the plant in ſome degree like cold, cauſing it to ſhut up its leaves a little, but never in any very great degree. The plant, however, is leaſt of all affected about nine o'clock in the morning, and that is conſequently the propereſt time to make experiments on it. A branch of the ſenſitive plant cut off, and laid by, retains yet its property of ſhutting up and opening in the morning for ſome days; and it holds it longer if kept with one end in water, than if left to dry more ſuddenly.

7. The leaves only of the ſenſitive plant ſhut up in the night, not the branches; and if it be touched at this time, the branches are affected in the ſame manner as in the day, ſhutting up, or approaching to the ſtalk or trunk, in the ſame manner, and often with more force. It is of no conſequence what the ſubſtance is with which the plant is touched, it anſwers alike to all; but there may be obſerved a little ſpot, diſtinguiſhable by its paler colour in the articulations of its leaves, where the greateſt and niceſt ſenſibility is evidently placed.

8. Duhamel having obſerved, about the 15th of September, in moderate weather, the natural motion of a branch of a ſenſitive plant, remarked, that at nine in the morning it formed with the ſtem an angle of 100 degrees; at noon, 112 degreees; at three afternoon, it returned to 100; and after touching the branch, the angle was reduced to 90. Three quarters of an hour after it had mounted to 112; and, at eight at night, it deſcended again, without being touched, to 90. The day after, in finer weather, the ſame branch, at eight in the morning, made an angle of 135 degrees with the ſtem; after being touched, the angle was diminiſhed to 80; an hour after, it roſe again to 135; being touched a ſecond time, it deſcended again to 80; an hour and a half after, it had riſen to 145; and on being

Senſitive. touched a third time, deſcended to 135; and remained in that poſition till five o'clock in the afternoon, when being touched a fourth time it fell to 110.

9. The parts of the plants which have collapſed afterwards unfold themſelves, and return to their former expanded ſtate. The time required for that purpoſe varies, according to the vigour of the plant, the ſeaſon of the year, the hour of the day, the ſtate of the atmoſphere. Sometimes half an hour is requiſite, ſometimes only ten minutes. The order in which the parts recover themſelves varies in like manner: ſometimes it is the common footſtalk; ſometimes the rib to which the leaves are attached; and ſometimes the leaves themſelves are expanded, before the other parts have made any attempt to be reinſtated in their former poſition.

10. If, without ſhaking the other ſmaller leaves, we cut off the half of a leaf or lobe belonging to the laſt pair, at the extremity or ſummit of a wing, the leaf cut, and its antagoniſt, that is to ſay, the firſt pair, begin to approach each other; then the ſecond, and ſo on ſucceſſively, till all the leſſer leaves, or lobes of that wing, have collapſed in like manner. Frequently, after 12 or 15 ſeconds, the lobes of the other wings, which were not immediately affected by the ſtroke, ſhut; whilſt the ſtalk and its wing, beginning at the bottom, and proceeding in order to the top, gradually recover themſelves. If, inſtead of one of the leſſer extreme leaves, we cut off one belonging to the pair that is next the footſtalk, its antagoniſt ſhuts, as do the other pairs ſucceſſively, from the bottom to the top. If all the leaves of one ſide of a wing be cut off, the oppoſite leaves are not affected, but remain expanded. With ſome addreſs, it is poſſible even to cut off a branch without hurting the leaves, or making them fall. The common footſtalk of the winged leaves being cut as far as three-fourths of its diameter, all the parts which hang down collapſe, but quickly recover without appearing to have ſuffered any conſiderable violence by the ſhock. An inciſion being made into one of the principal branches to the depth of one half the diameter, the branches ſituated betwixt the ſection and the root will fall down; thoſe above the inciſion remain as before, and the leſſer leaves continue open; but this direction is ſoon deſtroyed, by cutting off one of the lobes at the extremity, as was obſerved above. Laſtly, a whole wing being cut off with precaution near its inſertion into the common footſtalk, the other wings are not affected by it, and its own lobes do not ſhut. No motion enſues from piercing the branch with a needle or other ſharp inſtrument.

11. If the end of one of the leaves be burned with the flame of a candle, or by a burning glaſs, or by touching it with hot iron, it cloſes up in a moment, and the oppoſite leaf does the ſame, and after that the whole ſeries of leaves on each ſide of the partial or little footſtalk; then the footſtalk itſelf; then the branch or common footſtalk; all do the ſame, if the burning has been in a ſufficient degree. This proves that there is a very nice communication between all the parts of the plant, by means of which the burning, which only is applied to the extremity of one leaf, diffuſes its influence through every part of the ſhrub. If a drop of aquafortis be carefully laid upon a leaf of the ſenſitive plant, ſo as not to ſhake it in the leaſt, the leaf does not begin to move till the acrid liquor corrodes the ſubſtance of it; but at that time, not only that particular leaf, but all the leaves placed on the ſame footſtalk, cloſe themſelves up. Senſitive. The vapour of burning ſulphur has alſo this effect on many leaves at once, according as they are more or leſs expoſed to it; but a bottle of very acrid and ſulphureous ſpirit of vitriol, placed under the branches unſtopped, produces no ſuch effect. Wetting the leaves with ſpirit of wine has been obſerved alſo to have no effect, nor the rubbing oil of almonds over them; though this laſt application deſtroys many plants.

From the preceding experiments the following concluſions may be fairly drawn: 1. The contraction of the parts of the ſenſitive plant is occaſioned by an external force, and the contraction is in proportion to the force. 2. All bodies which can exert any force affect the ſenſitive plant; ſome by the touch or by agitation, as the wind, rain, &c.; ſome by chemical influence, as heat and cold. 3. Touching or agitating the plant produces a greater effect than an inciſion or cutting off a part, or by applying heat or cold.

Attempts have been made to explain theſe curious phenomena. Dr Darwin, in the notes to his admired poem, entitled, *The Botanic Garden*, lays it down as a principle, that "the ſleep of animals conſiſts in a ſuſpenſion of voluntary motion; and as vegetables are ſubject to ſleep as well as animals, there is reaſon to conclude (ſays he) that the various action of cloſing their petals and foliage may be juſtly aſcribed to a voluntary power; for without the faculty of volition ſleep would not have been neceſſary to them." Whether this definition of ſleep when applied to animals be juſt, we ſhall not inquire; but it is evident the ſuppoſed analogy between the ſleep of animals and the ſleep of plants has led Dr Darwin to admit this aſtoniſhing concluſion, that plants have volition. As volition preſuppoſes a mind or ſoul, it were to be wiſhed that he had given us ſome information concerning the nature of a vegetable ſoul, which can think and will. We ſuſpect, however, that this vegetable ſoul will turn out to be a mere mechanical or chemical one; for it is affected by external forces uniformly in the ſame way, its volition is merely paſſive, and never makes any ſucceſsful reſiſtance againſt thoſe cauſes by which it is influenced. All this is a mere abuſe of words. The ſleep of plants is a metaphorical expreſſion, and has not the leaſt reſemblance to the ſleep of animals. Plants are ſaid to ſleep when the flowers or leaves are contracted or folded together; but we never heard that there is any ſimilar contraction in the body of an animal during ſleep.

The fibres of vegetables have been compared with the muſcles of animals, and the motions of the ſenſitive plant have been ſuppoſed the ſame with muſcular motion. Between the fibres of vegetables and the muſcles of animals, however, there is not the leaſt ſimilarity. If muſcles be cut through, ſo as to be ſeparated from the joints to which they are attached, their powers are completely deſtroyed; but this is not the caſe with vegetable fibres. The following very ingenious experiment, which was communicated to us by a reſpectable member of the Univerſity of Edinburgh, is deciſive on this ſubject. He ſelected a growing poppy at that period of its growth, before unfolding, when the head and neck are bent down almoſt double. He cut the ſtalk where it was curved half through on the under ſide, and half

through

Sentence. through at a ſmall diſtance on the upper ſide, and half through in the middle point between the two ſections, ſo that the ends of the fibres were ſeparated from the ſtalk. Notwithſtanding theſe ſeveral cuttings on the neck, the poppy raiſed its head, and aſſumed a more erect poſition. There is, therefore, a complete diſtinction between muſcular motion and the motions of a plant, for no motion can take place in the limb of an animal when the muſcles of that limb are cut.

In fine, we look upon all attempts to explain the motions of plants as abſurd, and all reaſoning from ſuppoſed analogy between animals and vegetables as the ſource of wild conjecture, and not of ſound philoſophy. We view the contraction and expanſion of the ſenſitive plant in the ſame light as we do gravitation, chemical attraction, electricity, and magneti ſm, as a ſingular fact, the circumſtances of which we may be fully acquainted with, but muſt deſpair of underſtanding its cauſe.

What has been ſaid under this article chiefly refers to the *mimoſa ſenſitiva* and *pudica*. For a full account of the motions of vegetables in general, ſee *Vegetable Motion*, under the article MOTION.

SENTENCE, in *Law*, a judgement paſſed in court by the judge in ſome proceſs, either civil or criminal. See JUDGEMENT.

SENTENCE, in *Grammar*, denotes a period, or a ſet of words comprehending ſome perfect ſenſe or ſentiment of the mind. The buſineſs of pointing is to diſtinguiſh the ſeveral parts and members of ſentences, ſo as to render the ſenſe thereof as clear, diſtinct, and full as poſſible. See PUNCTUATION.

In every ſentence there are two parts neceſſarily required; a noun for the ſubject, and a definite verb: whatever is found more than theſe two, affects one of them, either immediately, or by the intervention of ſome other, whereby the firſt is affected.

Again, every ſentence is either ſimple or compound: a ſimple ſentence is that conſiſting of one ſingle ſubject, and one finite verb.—A compound ſentence contains ſeveral ſubjects and finite verbs, either expreſsly or implicitly.

A ſimple ſentence needs no point or diſtinction; only a period to cloſe it: as, "A good man loves virtue for itſelf."—In ſuch a ſentence, the ſeveral adjuncts affect either the ſubject or the verb in a different manner. Thus the word *good* expreſſes the quality of the ſubject, *virtue* the object of the action, and *for itſelf* the end thereof.—Now none of theſe adjuncts can be ſeparated from the reſt of the ſentence: for if one be, why ſhould not all the reſt? and if all be, the ſentence will be minced into almoſt as many parts as there are words.

But if ſeveral adjuncts be attributed in the ſame manner either to the ſubject or the verb, the ſentence becomes compound, and is to be divided into parts.

In every compound ſentence, as many ſubjects, or as many finite verbs as there are, either expreſsly or implied, ſo many diſtinctions may there be. Thus, "My hopes, fears, joys, pains, all centre in you." And thus
Cicero. *Catilina abiit, exceſſit, evaſit, erupit.*—The reaſon of which pointing is obvious; for as many ſubjects or finite verbs as there are in a ſentence, ſo many members does it really contain. Whenever, therefore, there occur more nouns than verbs, or contrariwiſe, they are to be conceived as equal. Since, as every ſubject requires its verbs, ſo every verb requires its ſubject, where- Senticoſæ
with it may agree: excepting, perhaps, in ſome figu- Sentiments.
rative expreſſions.

SENTICOSÆ (from *ſentis*, a "briar or bramble"); the name of the 35th order in Linnæus's fragments of a natural method, conſiſting of roſe, bramble, and other plants, which reſemble them in port and external ſtructure. See BOTANY, *Natural Method.*

SENTIMENT, according to Lord Kames, is a term appropriated to ſuch thoughts as are prompted by paſſion. It differs from a perception; for a perception ſignifies the act by which we become conſcious of external objects. It differs from conſciouſneſs of an internal action, ſuch as thinking, ſuſpending thought, inclining, reſolving, willing, &c. And it differs from the conception of a relation among objects; a conception of that kind being termed *opinion*.

SENTIMENTS, in *Poetry*. To talk in the language of muſic, each paſſion has a certain tone, to which every ſentiment proceeding from it ought to be tuned with the greateſt accuracy: which is no eaſy work, eſpecially where ſuch harmony ought to be ſupported during the courſe of a long theatrical repreſentation. In order to reach ſuch delicacy of execution, it is neceſſary that a writer aſſume the preciſe character and paſſion of the perſonage repreſented; which requires an uncommon genius. But it is the only difficulty; for the writer, who, annihilating himſelf, can thus become another perſon, need be in no pain about the ſentiments that belong to the aſſumed character: theſe will flow without the leaſt ſtudy, or even preconception; and will frequently be as delightfully new to himſelf as to his reader. But if a lively picture even of a ſingle emotion require an effort of genius, how much greater the effort to compoſe a paſſionate dialogue with as many different tones of paſſion as there are ſpeakers? With what ductility of feeling muſt that writer be endued, who approaches perfection in ſuch a work; when it is neceſſary to aſſume different and even oppoſite characters and paſſions in the quickeſt ſucceſſion? Yet this work, difficult as it is, yields to that of compoſing a dialogue in genteel comedy, exhibiting characters without paſſion. The reaſon is, that the different tones of character are more delicate, and leſs in ſight, than thoſe of paſſion; and, accordingly, many writers, who have no genius for drawing characters, make a ſhift to repreſent, tolerably well, an ordinary paſſion in its ſimple movements. But of all works of this kind, what is truly the moſt difficult, is a characteriſtical dialogue upon any philoſophical ſubject; to interweave characters with reaſoning, by ſuiting to the character of each ſpeaker a peculiarity not only of thought but of expreſſion, requires the perfection of genius, taſte, and judgement.

How difficult dialogue-writing is, will be evident, even without reaſoning, from the miſerable compoſitions of that kind found without number in all languages. The art of mimicking any ſingularity in geſture or in voice, is a rare talent, though directed by ſight and hearing, the acuteſt and moſt lively of our external ſenſes: how much more rare muſt that talent, of imitating characters and internal emotions, tracing all their different tints, and repreſenting them in a lively manner by natural ſentiments properly expreſſed? The truth is, ſuch execution is too delicate for an ordinary genius;

Sentiments. and for that reaſon the bulk of writers, inſtead of expreſſing a paſſion as one does who feels it, content themſelves with deſcribing it in the language of a ſpectator. To awake paſſion by an internal effort merely, without any external cauſe, requires great ſenſibility; and yet that operation is neceſſary, not leſs to the writer than to the actor; becauſe none but thoſe who actually feel a paſſion can repreſent it to the life. The writer's part is the more complicated: he muſt add compoſition to paſſion: and muſt, in the quickeſt ſucceſſion, adopt every different character. But a very humble flight of imagination may ſerve to convert a writer into a ſpectator, ſo as to figure, in ſome obſcure manner, an action as paſſing in his ſight and hearing. In that figured ſituation, being led naturally to write like a ſpectator, he entertains his readers with his own reflections, with cool deſcription, and florid declamation; inſtead of making them eye-witneſſes, as it were, to a real event, and to every movement of genuine paſſion. Thus moſt of our plays appear to be caſt in the ſame mould; perſonages without character, the mere outlines of paſſion, a tireſome monotony, and a pompous declamatory ſtyle.

This deſcriptive manner of repreſenting paſſion is a very cold entertainment; our ſympathy is not raiſed by deſcription; we muſt firſt be lulled into a dream of reality, and every thing muſt appear as paſſing in our ſight. Unhappy is the player of genius who acts a part in what may be termed a *deſcriptive tragedy*; after aſſuming the very paſſion that is to be repreſented, how is he cramped in action, when he muſt utter, not the ſentiments of the paſſion he feels, but a cold deſcription in the language of a byſtander? It is that imperfection, undoubtedly, in the bulk of our plays, which confines our ſtage almoſt entirely to Shakeſpeare, notwithſtanding his many irregularities. In our late Engliſh tragedies, we ſometimes find ſentiments tolerably well adapted to a plain paſſion: but we muſt not in any of them expect a ſentiment expreſſive of character: and, upon that very account, our late performances of the dramatic kind are for the moſt part intolerably inſipid.

But it may be proper to illuſtrate this ſubject by examples. The firſt examples ſhall be of ſentiments that appear the legitimate offſpring of paſſion; to which ſhall be oppoſed what are deſcriptive only, and illegitimate; and in making this compariſon, the inſtances ſhall be borrowed from Shakeſpeare and Corneille, who for genius in dramatic compoſition ſtand uppermoſt in the rolls of fame.

I. Shakeſpeare ſhall furniſh the firſt example, being of ſentiments dictated by a violent and perturbed paſſion:

Lear. ——————Filial ingratitude!
Is it not as if this mouth ſhould tear this hand
For lifting food to't?—But I'll puniſh home;
No, I will weep no more.——In ſuch a night,
To ſhut me out!——Pour on, I will endure.
In ſuch a night as this! O Regan, Goneril,
Your old kind father, whoſe frank heart gave all—
O! that way madneſs lies; let me ſhun that;
No more of that.——————
Kent. Good, my lord, enter here.
Lear. Prithee, go in thyſelf, ſeek thine own eaſe,
This tempeſt will not give me leave to ponder Sentiments.
On things would hurt me more:—but I'll go in;
In, boy, go firſt. You houſeleſs poverty——
Nay, get thee in; I'll pray, and then I'll ſleep——
Poor naked wretches, whereſoe'er you are,
That bide the pelting of this pitileſs ſtorm!
How ſhall your houſeleſs heads, and unfed ſides,
Your loop'd and window'd raggedneſs, defend you
From ſeaſons ſuch as theſe!——O I have ta'en
Too little care of this! take phyſic, Pomp;
Expoſe thyſelf to feel what wretches feel,
That thou may'ſt ſhake the ſuperflux to them,
And ſhow the heav'ns more juſt.

King Lear, act iii. ſc. 5.

With regard to the French author, truth obliges us to acknowledge, that he deſcribes in the ſtyle of a ſpectator, inſtead of expreſſing paſſion like one who feels it; which naturally betrays him into a tireſome monotony, and a pompous declamatory ſtyle. It is ſcarcely neceſſary to give examples, for he never varies from that tone. We ſhall, however, take two paſſages at a venture, in order to be confronted with thoſe tranſcribed above. In the tragedy of Cinna, after the conſpiracy was diſcovered, Æmilia, having nothing in view but racks and death to herſelf and her lover, receives a pardon from Auguſtus, attended with the brighteſt circumſtances of magnanimity and tenderneſs. This is a lucky ſituation for repreſenting the paſſions of ſurpriſe and gratitude in their different ſtages, which ſeem naturally to be what follow. Theſe paſſions, raiſed at once to the utmoſt pitch, and being at firſt too big for utterance, muſt, for ſome moments, be expreſſed by violent geſtures only: ſo ſoon as there is vent for words, the firſt expreſſions are broken and interrupted: at laſt, we ought to expect a tide of intermingled ſentiments, occaſioned by the fluctuation of the mind between the two paſſions. Æmilia is made to behave in a very different manner: with extreme coolneſs ſhe deſcribes her own ſituation, as if ſhe were merely a ſpectator; or rather the poet takes the taſk off her hands:

Et je me rends, Seigneur, à ces hautes bontés:
Je recouvre la vûe auprès de leurs clartés.
Je connois mon forfait qui me ſembloit juſtice;
Et ce que n'avoit pû la terreur du ſupplice,
Je ſens naitre en mon ame un repentir puiſſant,
Et mon cœur en ſecret me dit, qu'il y conſent.
Le ciel a réſolu votre grandeur ſuprême;
Et pour preuve, Seigneur, je n'en veux que moi-même.
J'oſe avec vanité me donner cet éclat,
Puiſqu'il change mon cœur, qu'il veut changer l'état.
Ma haine va mourir, que j'ai crue immortelle;
Elle eſt morte, et ce cœur devient ſujet fidele;
Et prenant déſormais cette haine en horreur,
L'ardeur de vous ſervir ſuccede à ſa fureur.

Act v. ſc. 3.

So much in general on the genuine ſentiments of paſſion. We proceed to particular obſervations. And, firſt, paſſions ſeldom continue uniform any conſiderable time: they generally fluctuate, ſwelling and ſubſiding by turns, often in a quick ſucceſſion; and the ſentiments cannot be juſt unleſs they correſpond to ſuch fluctuation. Accordingly, a climax never ſhows better than in expreſſing a ſwelling paſſion: the following paſſages may ſuffice for an illuſtration.

Almeria.

Sentiments.

Almeria. ——————How haſt thou charm'd
The wildneſs of the waves and rocks to this;
That thus relenting they have giv'n thee back
To earth, to light and life, to love and me?
Mourning Bride, act i. ſc. 7.

I would not be the villain that thou think'ſt
For the whole ſpace that's in the tyrant's graſp,
And the rich earth to boot.
Macbeth, act iv. ſc. 4.

The following paſſage expreſſes finely the progreſs of conviction.

Let me not ſtir, nor breathe, leſt I diſſolve
That tender, lovely form, of painted air,
So like Almeria. Ha! it ſinks, it falls;
I'll catch it e'er it goes, and graſp her ſhade.
'Tis life! 'tis warm! 'tis ſhe! 'tis ſhe herſelf!
It is Almeria! 'tis, it is my wife!
Mourning Bride, act ii. ſc. 6.

In the progreſs of thought our reſolutions become more vigorous as well as our paſſions.

If ever I do yield or give conſent,
By any action, word, or thought, to wed
Another lord; may then juſt heav'n ſhow'r down, &c.
Mourning Bride, act i. ſc. 1.

And this leads to a ſecond obſervation, That the different ſtages of a paſſion, and its different directions, from birth to extinction, muſt be carefully repreſented in their order; becauſe otherwiſe the ſentiments, by being miſplaced, will appear forced and unnatural.—Reſentment, for example, when provoked by an atrocious injury, diſcharges itſelf firſt upon the author: ſentiments therefore of revenge come always firſt, and muſt in ſome meaſure be exhauſted before the perſon injured think of grieving for himſelf. In the Cid of Corneille, Don Diegue having been affronted in a cruel manner, expreſſes ſcarcely any ſentiment of revenge, but is totally occupied in contemplating the low ſituation to which he is reduced by the affront:

O rage! ô deſeſpoir! ô vieilleſſe ennemie!
N'ai-je donc tant vecu que pour cette infamie?
Et ne ſuis-je blanchi dans les travaux guerriers,
Que pour voir en un jour fletrit tant de lauriers?
Mon bras, qu'avec reſpect tout l'Eſpagne admire,
Mon bras qui tant de fois a ſauvé cet empire,
Tant de fois affermi le trône de ſon roi,
Trahit donc ma querelle, et ne fait rien pour moi!
O cruel ſouvenir de ma gloire paſſé!
Oeuvre de tant de jours en un jour effacée!
Nouvelle dignité fatale à mon bonheur!
Precipice élevé d'où tombe mon honneur!
Faut-il de votre êclat voir triompher le comte,
Et mourir ſans vengeance, ou vivre dans la honte?
Comte, ſois de mon prince à preſent gouverneur,
Ce haut rang n'admet point un homme ſans honneur;
Et ton jaloux orgueil par cet affront inſigne,
Malgré le choix du roi, m'en a ſû rendre indigne.
Et toi, de mes exploits glorieux inſtrument,
Mais d'un corps tout de glace inutile ornement,
Fer jadis tant à craindre, et qui dans cette offenſe,
M'as ſervi de parade, et non pas de defenſe,
Va, quitte deſormais le dernier des humains,
Paſſe pour me venger en de meilleures mains.
Le Cid, act i. ſc. 7.

Sentiments.

Theſe ſentiments are certainly not the firſt that are ſuggeſted by the paſſion of reſentment. As the firſt movements of reſentment are always directed to its object, the very ſame is the caſe of grief. Yet with relation to the ſudden and ſevere diſtemper that ſeized Alexander bathing in the river Cydnus, Quintus Curtius deſcribes the firſt emotions of the army as directed to themſelves, lamenting that they were left without a leader, far from home, and had ſcarce any hopes of returning in ſafety: their king's diſtreſs, which muſt naturally have been their firſt concern, occupies them but in the ſecond place according to that author. In the Aminta of Taſſo, Sylvia, upon a report of her lover's death, which ſhe believed certain, inſtead of bemoaning the loſs of her beloved, turns her thoughts upon herſelf, and wonders her heart does not break:

Ohime, ben ſon di ſaſſo,
Poi che queſta novella non m'uccide.
Act iv. ſc. 2.

In the tragedy of Jane Shore, Alicia, in the full purpoſe of deſtroying her rival, has the following reflection:

Oh Jealouſy! thou bane of pleaſing friendſhip,
Thou worſt invader of our tender boſoms;
How does thy rancour poiſon all our ſoftneſs,
And turn our gentle nature into bitterneſs!
See where ſhe comes! Once my heart's deareſt bleſſing,
Now my chang'd eyes are blaſted with her beauty,
Loathe that known face, and ſicken to behold her.
Act iii. ſc. 1.

Theſe are the reflections of a cool ſpectator. A paſſion, while it has the aſcendant, and is freely indulged, ſuggeſts not to the perſon who feels it any ſentiment to its own prejudice: reflections like the foregoing occur not readily till the paſſion has ſpent its vigour.

A perſon ſometimes is agitated at once by different paſſions; and the mind in that caſe, vibrating like a pendulum, vents itſelf in ſentiments that partake of the ſame vibration. This we give as a third obſervation:

Queen. Would I had never trod this Engliſh earth,
Or feit the flatteries that grow upon it!
Ye've angels faces, but heav'n knows your hearts.
What ſhall become of me now? wretched lady!
I am the moſt unhappy woman living.
Alas! poor wenches, where are now your fortunes?
[*To her women.*
Shipwreck'd upon a kingdom, where no pity,
No friends, no hope, no kindred, weep for me:
Almoſt no grave allow'd me.
Henry VIII. act iii. ſc. 1.

Othello. Oh devil, devil!
If that the earth could teem with woman's tears,
Each drop ſhe falls would prove a crocodile.
Out of my ſight!
Deſdemona. I will not ſtay t'offend you. [*Going.*
Lodovico. Truly, an obedient lady:
I do beſeech your lordſhip, call her back.
Oth. Miſtreſs——

Deſ.

Sentiments.

Def. My lord.
Oth. What would you with her, Sir?
Lod. Who, I, my lord?
Oth. Ay; you did wiſh that I would make her turn.
Sir, ſhe can turn and turn, and yet go on;
And turn again. And ſhe can weep, Sir, weep;
And ſhe's obedient: as you ſay, obedient:
Very obedient—proceed you in your tears—
Concerning this, Sir,—oh well painted paſſion!—
I am commanded home—get you away,
I'll ſend for you anon—Sir, I obey the mandate,
And will return to Venice.——Hence, avaunt!
[*Exit* Deſdemona.
Othello, act iv. ſc. 6.

Æmilia. Oh! my good lord, I would ſpeak a word with you.
Othello. Yes, 'tis Æmilia—By and by.—She's dead.
'Tis like ſhe comes to ſpeak of Caſſio's death;
The noiſe was high.—Ha! no more moving?
Still as the grave. Shall ſhe come in? wer't good?
I think ſhe ſtirs again—No—what's the beſt?
If ſhe come in, ſhe'll, ſure, ſpeak to my wife:
My wife! my wife! what wife? I have no wife;
Oh inſupportable! oh heavy hour!
Othello, act v. ſc. 7.

A fourth obſervation is, That nature, which gave us paſſions, and made them extremely beneficial when moderate, intended undoubtedly that they ſhould be ſubjected to the government of reaſon and conſcience. It is therefore againſt the order of nature, that paſſion in any caſe ſhould take the lead in contradiction to reaſon and conſcience: ſuch a ſtate of mind is a ſort of anarchy which every one is aſhamed of and endeavours to hide or diſſemble. Even love, however laudable, is attended with a conſcious ſhame when it becomes immoderate: it is covered from the world, and diſcloſed only to the beloved object:

Et que l'amour ſouvent de remors combattu
Paroiſſe une foibleſſe, et non une vertu.
Boileau, *l'Art Poet.* chant. iii. l. 101.

O, they love leaſt that let men know they love.
Two Gentleman of Verona, act i. ſc. 3.

Hence a capital rule in the repreſentation of immoderate paſſions, that they ought to be hid or diſſembled as much as poſſible. And this holds in an eſpecial manner with reſpect to criminal paſſions: one never counſels the commiſſion of a crime in plain terms; guilt muſt not appear in its native colours, even in thought; the propoſal muſt be made by hints, and by repreſenting the action in ſome favourable light. Of the propriety of ſentiment upon ſuch an occaſion, Shakeſpeare, in the *Tempeſt*, has given us a beautiful example, in a ſpeech by the uſurping duke of Milan, adviſing Sebaſtian to murder his brother the king of Naples:

Antonio. ——————What might,
Worthy Sebaſtian,—O, what might—no more.
And yet, methinks, I ſee it in thy face
What thou ſhouldſt be: the occaſion ſpeaks thee, and
My ſtrong imagination ſees a crown
Dropping upon thy head. Act ii. ſc. 2.

A picture of this kind, perhaps ſtill finer, is exhibited in *King John*, where that tyrant ſolicits (act iii. ſc. 5.) Hubert to murder the young prince Arthur; but it is too long to be inſerted here. Sentiments.

II. As things are beſt illuſtrated by their contraries, we proceed to faulty ſentiments, diſdaining to be indebted for examples to any but the moſt approved authors. The firſt claſs ſhall conſiſt of ſentiments that accord not with the paſſion; or, in other words, ſentiments that the paſſion does not naturally ſuggeſt. In the ſecond claſs ſhall be ranged ſentiments that may belong to an ordinary paſſion, but unſuitable to it as tinctured by a ſingular character. Thoughts that properly are not ſentiments, but rather deſcriptions, make a third. Sentiments that belong to the paſſion repreſented, but are faulty as being introduced too early or too late, make a fourth. Vicious ſentiments expoſed in their native dreſs, inſtead of being concealed or diſguiſed, make a fifth. And in the laſt claſs ſhall be collected ſentiments ſuited to no character nor paſſion, and therefore unnatural.

The *firſt* claſs contains faulty ſentiments of various kinds, which we ſhall endeavour to diſtinguiſh from each other.

1. Of ſentiments that are faulty by being above the tone of the paſſion, the following may ſerve as an example:

Othello.——————O my ſoul's joy!
If after every tempeſt come ſuch calms,
May the winds blow till they have waken'd death:
And let the labouring bark climb hills of ſeas
Olympus high, and duck again as low
As hell's from heaven? *Othello*, act ii. ſc. 6.

This ſentiment may be ſuggeſted by violent and inflamed paſſion; but is not ſuited to the ſatisfaction, however great, that one feels upon eſcaping danger.

2. Inſtance of ſentiments below the tone of the paſſion. Ptolemy, by putting Pompey to death, having incurred the diſpleaſure of Cæſar, was in the utmoſt dread of being dethroned: in that agitating ſituation, Corneille makes him utter a ſpeech full of cool reflection, that is in no degree expreſſive of the paſſion.

Ah! ſi je t'avois crû, je n'aurois pas de maitre,
Je ſerois dans le trône où le ciel m'a fait naître;
Mais c'eſt une imprudence aſſez commune aux rois,
D'écouter trop d'avis, et ſe tromper au choix.
Le Deſtin les aveugle au bord du précipice,
Ou ſi quelque lumiere en leur ame ſe gliſſe,
Cette fauſſe clarté dont il les eblouit,
Le plonge dans une gouffre, et puis s'evanouit.
La Mort de Pompée, act iv. ſc. 1.

3. Sentiments that agree not with the tone of the paſſion; as where a pleaſant ſentiment is grafted upon a painful paſſion, or the contrary. In the following inſtances, the ſentiments are too gay for a ſerious paſſion:

No happier taſk theſe faded eyes purſue;
To read and weep is all they now can do.
Eloiſa to Abelard, l. 47.

Again;

Heav'n firſt taught letters for ſome wretch's aid,
Some baniſh'd lover, or ſome captive maid:

They

Sentiments. They live, they ſpeak, they breathe what love inſpires,
Warm from the ſoul, and faithful to its fires;
The virgin's wiſh without her fears impart,
Excuſe the bluſh, and pour out all the heart;
Speed the ſoft intercourſe from ſoul to ſoul,
And waft a ſigh from Indus to the pole.
Eloiſa to Abelard, l. 51.

Theſe thoughts are pretty: they ſuit Pope, but not Eloiſa.

Satan, enraged by a threatening of the angel Gabriel, anſwers thus:

Then when I am thy captive, talk of chains,
Proud limitary cherub; but ere then
Far heavier load thyſelf expect to feel
From my prevailing arm, though heaven's King
Ride on thy wings, and thou with thy compeers,
Us'd to the yoke, draw'ſt his triumphant wheels
In progreſs thro' the road of heav'n *ſtar pav'd*.
Paradiſe Loſt, book iv.

The concluding epithet forms a grand and delightful image, which cannot be the genuine offſpring of rage.

4. Sentiments too artificial for a ſerious paſſion. The firſt example is a ſpeech of Percy expiring.

O, Harry, thou haſt robb'd me of my growth:
I better brook the loſs of brittle life,
Than thoſe proud titles thou haſt won of me:
They wound my thoughts worſe than thy ſword my flesh.
But thought's the ſlave of life, and life time's fool;
And time, that takes ſurvey of all the world,
Muſt have a ſtop.
Firſt Part, Henry IV. act v. ſc. 9.

The ſentiments of the *Mourning Bride* are for the moſt part no leſs delicate than juſt copies of nature: in the following exception the picture is beautiful, but too artful to be ſuggeſted by ſevere grief.

Almeria. O no! Time gives increaſe to my afflictions.
The circling hours, that gather all the woes
Which are diffus'd through the revolving year,
Come heavy laden with th' oppreſſive weight
To me; with me, ſucceſſively, they leave
The ſighs, the tears, the groans, the reſtleſs cares,
And all the damps of grief, that did retard their flight;
They ſhake their downy wings, and ſcatter all
The dire collected dews on my poor head;
Then fly with joy and ſwiftneſs from me. Act i. ſc. 1.

In the ſame play, Almeria ſeeing a dead body, which ſhe took to be Alphonſo's, expreſſes ſentiments ſtrained and artificial, which nature ſuggeſts not to any perſon upon ſuch an occaſion:

Had they or hearts or eyes, that did this deed?
Could eyes endure to guide ſuch cruel hands?
Are not my eyes guilty alike with theirs,
That thus can gaze, and yet not turn to ſtone?
—I do not weep! The ſprings of tears are dry'd,
And of a ſudden I am calm, as if
All things were well; and yet my huſband's murder'd!
Yes, yes, I know to mourn: I'll ſluice this heart, Sentiments.
The ſource of wo, and let the torrent in.
Act v. ſc. 11.

Pope's elegy to the memory of an unfortunate lady, expreſſes delicately the moſt tender concern and ſorrow that one can feel for the deplorable fate of a perſon of worth. Such a poem, deeply ſerious and pathetic, rejects with diſdain all fiction. Upon that account, the following paſſage deſerves no quarter; for it is not the language of the heart, but of the imagination indulging its flights at eaſe, and by that means is eminently diſcordant with the ſubject. It would be a ſtill more ſevere cenſure, if it ſhould be aſcribed to imitation, copying indiſcreetly what has been ſaid by others:

What though no weeping loves thy aſhes grace,
Nor poliſh'd marble emulate thy face?
What though no ſacred earth allow thee room,
Nor hallow'd dirge be mutter'd o'er thy tomb?
Yet ſhall thy grave with riſing flow'rs be dreſt,
And the green turf lie lightly on thy breaſt:
There ſhall the morn her earlieſt tears beſtow,
There the firſt roſes of the year ſhall blow;
While angels with their ſilver wings o'erſhade
The ground, now ſacred by thy relics made.

5. Fanciful or finical ſentiments. Sentiments that degenerate into point or conceit, however they may amuſe in an idle hour, can never be the offſpring of any ſerious or important paſſion. In the *Jeruſalem* of Taſſo, Tancred, after a ſingle combat, ſpent with fatigue and loſs of blood, falls into a ſwoon; in which ſituation, underſtood to be dead, he is diſcovered by Erminia, who was in love with him to diſtraction. A more happy ſituation cannot be imagined, to raiſe grief in an inſtant to its higheſt pitch; and yet, in venting her ſorrow, ſhe deſcends moſt abominably into antitheſis and conceit even of the loweſt kind:

E in lui verſò d'inefficabil vena
Lacrime, e voce di ſoſpiri miſta.
In che miſero punto hor qui me mena
Fortuna? a che veduta amara e triſta?
Dopo gran tempo i' ti ritrovo à pena
Tancredi, e ti riveggio, e non ſon viſta
Viſta non ſon da te, benche preſente
T' trovando ti perdo eternamente.
Canto xix. ſt. 105.

Armida's lamentation reſpecting her lover Rinaldo is in the ſame vicious taſte. *Vid.* canto xx. ſtan. 124, 125, 126.

Queen. Give me no help in lamentation,
I am not barren to bring forth complaints:
All ſprings reduce their currents to mine eyes,
That I, being govern'd by the wat'ry moon,
May ſend forth plenteous tears to drown the world,
Ah, for my huſband, for my dear lord Edward.
King Richard III. act ii. ſc. 2.

Jane Shore utters her laſt breath in a witty conceit:

Then all is well, and I ſhall ſleep in peace——
'Tis very dark, and I have loſt you now——
Was there not ſomething I would have bequeath'd you?

But

Sentiments. But I have nothing left me to beſtow,
Nothing but one ſad ſigh. Oh mercy, Heav'n! [*Dies.*
Act v.

Guilford to Lady Jane Gray, when both were condemn'd to die:

Thou ſtand'ſt unmov'd;
Calm temper ſits upon thy beauteous brow;
Thy eyes that flow'd ſo faſt for Edward's loſs,
Gaze unconcern'd upon the ruin round thee,
As if thou had'ſt reſolv'd to brave thy fate,
And triumph in the midſt of deſolation.
Ha! ſee, it ſwells, the liquid cryſtal riſes,
It ſtarts in ſpite of thee——but I will catch it,
Nor let the earth be wet with dew ſo rich.
Lady Jane Gray, act iv. near the end.

The concluding ſentiment is altogether finical, unſuitable to the importance of the occaſion, and even to the dignity of the paſſion of love.

Corneille, in his *Examen of the Cid*, anſwering an objection, That his ſentiments are ſometimes too much refined for perſons in deep diſtreſs, obſerves, that if poets did not indulge ſentiments more ingenious or refined than are prompted by paſſion, their performances would often be low, and extreme grief would never ſuggeſt but exclamations merely. This is in plain language to aſſert, that forced thoughts are more agreeable than thoſe that are natural, and ought to be preferred.

The *ſecond* claſs is of ſentiments that may belong to an ordinary paſſion, but are not perfectly concordant with it, as tinctured by a ſingular character.

In the laſt act of that excellent comedy *The Careleſs Huſband*, Lady Eaſy, upon Sir Charles's reformation, is made to expreſs more violent and turbulent ſentiments of joy than are conſiſtent with the mildneſs of her character.

Lady Eaſy. O the ſoft treaſure! O the dear reward of long-deſiring love.—Thus! thus to have you mine, is ſomething more than happineſs; 'tis double life, and madneſs of abounding joy.

The following inſtances are deſcriptions rather than ſentiments, which compoſe a *third* claſs.

Of this deſcriptive manner of painting the paſſions, there is in the *Hippolytus* of Euripides, act v. an illuſtrious inſtance, viz. the ſpeech of Theſeus, upon hearing of his ſon's diſmal exit. In Racine's tragedy of *Eſther*, the queen hearing of the decree iſſued againſt her people, inſtead of expreſſing ſentiments ſuitable to the occaſion, turns her attention upon herſelf, and deſcribes with accuracy her own ſituation.

Juſte ciel! tout mon ſang dans mes veines ſe glace.
Act i. ſc. 3.

Again,

Aman. C'en eſt fait. Mon orgueil eſt forcé de plier.
L'inexorable Amen eſt reduit à prier.
Eſther, act iii. ſc. 5.

Athalie. Quel prodige nouveau me trouble et m'embarraſſe?
La douceur de ſa voix, ſon enfance, ſa grace,
Font inſenſiblement à mon inimitié
Succeder——Je ſerois ſenſible à la pitié?
Athalie, act ii. ſc. 7. Sentiments.

Titus. O de ma paſſion fureur deſeſperée!
Brutus of Voltaire, act iii. ſc. 6.

What other are the foregoing inſtances but deſcribing the paſſion another feels?

The *fourth* claſs is of ſentiments expreſſed too early or too late.

Some examples mentioned above belong to this claſs. Add the following from *Venice Preſerv'd*, act v. at the cloſe of the ſcene between Belvidera and her father Priuli. The account given by Belvidera of the danger ſhe was in, and of her huſband's threatening to murder her, ought naturally to have alarmed her relenting father, and to have made him expreſs the moſt perturbed ſentiments. Inſtead of which, he diſſolves into tenderneſs and love for his daughter, as if he had already delivered her from danger, and as if there were a perfect tranquillity:

Canſt thou forgive me all my follies paſt!
I'll henceforth be indeed a father; never,
Never more thus expoſe, but cheriſh thee,
Dear as the vital warmth that feeds my life,
Dear as thoſe eyes that weep in fondneſs o'er thee:
Peace to thy heart.

Immoral ſentiments expoſed in their native colours, inſtead of being concealed or diſguiſed, compoſe the *fifth* claſs.

The Lady Macbeth, projecting the death of the king, has the following ſoliloquy:

——————The raven himſelf's not hoarſe
That croaks the fatal entrance of Duncan
Under my battlements. Come, all you ſpirits
That tend on mortal thoughts, unſex me here,
And fill me from the crown to the toe, top full
Of direſt cruelty; make thick my blood,
Stop up th' acceſs and paſſage to remorſe,
That no compunctious viſitings of nature
Shake my fell purpoſe. *Macbeth*, act i. ſc. 7.

This ſpeech is not natural. A treacherous murder was never perpetrated even by the moſt hardened miſcreant without compunction: and that the lady here muſt have been in horrible agitation, appears from her invoking the infernal ſpirits to fill her with cruelty, and to ſtop up all avenues to remorſe. But in that ſtate of mind it is a never-failing artifice of ſelf-deceit to draw the thickeſt veil over the wicked action, and to extenuate it by all the circumſtances that imagination can ſuggeſt: and if the crime cannot bear diſguiſe, the next attempt is to thruſt it out of mind altogether, and to ruſh on to action without thought. This laſt was the huſband's method.

Strange things I have in head, that will to hand;
Which muſt be acted ere they muſt be ſcann'd.
Act iii. ſc. 5.

The lady follows neither of theſe courſes, but in a deliberate manner endeavours to fortify her heart in the commiſſion of an execrable crime, without even attempting to colour it. This, we think, is not natural; we hope

Sentiments. hope there is no ſuch wretch to be found as is here repreſented.

The *laſt* claſs comprehends ſentiments that are unnatural, as being ſuited to no character nor paſſion. Theſe may be ſubdivided into three branches: firſt, ſentiments unſuitable to the conſtitution of man, and to the laws of his nature; ſecond, inconſiſtent ſentiments; third, ſentiments that are pure rant and extravagance.

When the fable is of human affairs, every event, every incident, and every circumſtance, ought to be natural, otherwiſe the imitation is imperfect. But an imperfect imitation is a venial fault, compared with that of running croſs to nature. In the *Hippolytus* of Euripides (act iv. ſc. 5.), Hippolytus, wiſhing for another ſelf in his own ſituation, "How much (ſays he) ſhould I be touched with his misfortune!" as if it were natural to grieve more for the misfortune of another than for one's own.

Oſmyn. Yet I behold her—yet—and now no more.
Turn your lights inward, eyes, and view my thoughts;
So ſhall you ſtill behold her—'twill not be.
O impotence of ſight! mechanic ſenſe
Which to exterior objects ow'ſt thy faculty,
Not ſeeing of election, but neceſſity.
Thus do our eyes, as do all common mirrors,
Succeſſively reflect ſucceeding images.
Nor what they would, but muſt; a ſtar or toad;
Juſt as the hand of chance adminiſters!
Mourning Bride, act ii. ſc. 8.

No man in his ſenſes, ever thought of applying his eyes to diſcover what paſſes in his mind; far leſs of blaming his eyes for not ſeeing a thought or idea. In Moliere's *l'Avare* (act iv. ſc. 7.) Harpagon, being robbed of his money, ſeizes himſelf by the arm, miſtaking it for that of the robber. And again he expreſſes himſelf as follow:

Je veux aller querir la juſtice, et faire donner la queſtion à toute ma maiſon; à ſervantes, à valets, à fils, à fille, et à moi auſſi.

This is ſo abſurd as ſcarcely to provoke a ſmile, if it be not at the author.

Of the ſecond branch the following example may ſuffice:

——————Now bid me run,
And I will ſtrive with things *impoſſible*,
Yea, get the better of them.
Julius Cæſar, act ii. ſc. 3.

Of the third branch, take the following ſamples. Lucan, talking of Pompey's ſepulchre,

——————— Romanum nomen, et omne
Imperium magno eſt tumuli modus. Obrue ſaxa
Crimine plena deûm. Si tota eſt Herculis Oete,
Et juga tota vacant Bromio Nyſeia; quare
Unus in Egypto Magno lapis? Omnia Lagi
Rura tenere poteſt, ſi nullo ceſpite nomen
Hæſerit. Erremus populi, cinerumque tuorum,
Magne, metu nullas Nili calcemus arenas.
Lib. viii. l. 798.

Thus, in Rowe's tranſlation:

Where there are ſeas, or air, or earth, or ſkies,
Where'er Rome's empire ſtretches, Pompey lies.
Far be the vile memorial then convey'd!
Nor let this ſtone the partial gods upbraid.
Shall Hercules all Oeta's heights demand,
And Nyſa's hill for Bacchus only ſtand;
While one poor pebble is the warrior's doom
That fought the cauſe of liberty and Rome?
If Fate decrees he muſt in Egypt lie,
Let the whole fertile realm his grave ſupply,
Yield the wide country to his awful ſhade,
Nor let us dare on any part to tread,
Fearful we violate the mighty dead.

Sentiments || Sentinel.

The following paſſages are pure rant. Coriolanus, ſpeaking to his mother,

What is this?
Your knees to me? to your corrected ſon?
Then let the pebbles on the hungry beach
Fillop the ſtars: then let the mutinous winds
Strike the proud cedars 'gainſt the fiery ſun:
Murd'ring impoſſibility, to make
What cannot be, ſlight work.
Coriolanus, act i. ſc. 3.

Cæſar. ———Danger knows full well,
That Cæſar is more dangerous than he.
We were two lions litter'd in one day,
And I the elder and more terrible.
Julius Cæſar, act ii. ſc. 4.

Ventidius. But you, ere love miſled your wand'ring eyes,
Were ſure the chief and beſt of human race,
Fram'd in the very pride and boaſt of nature,
So perfect, that the gods who form'd you wonder'd
At their own ſkill, and cry'd, A lucky hit
Has mended our deſign. DRYDEN, *All for Love*, act i.

Not to talk of the impiety of this ſentiment, it is ludicrous inſtead of being lofty.

The famous epitaph on Raphael is not leſs abſurd than any of the foregoing paſſages:

Raphael, timuit, quo ſoſpite, vinci,
Rerum magna parens, et moriente mori.

Imitated by Pope, in his epitaph on Sir Godfrey Kneller:

Living, great Nature fear'd he might outvie
Her works; and dying, fears herſelf may die.

Such is the force of imitation; for Pope of himſelf would never have been guilty of a thought ſo extravagant.

SENTINEL, or SENTRY, in military affairs, a private ſoldier placed in ſome poſt to watch the approach of the enemy, to prevent ſurpriſes, to ſtop ſuch as would paſs without orders or diſcovering who they are. They are placed before the arms of all guards, at the tents and doors of general officers, colonels of regiments, &c.

SENTINEL Perdu, a ſoldier poſted near an enemy, or in ſome very dangerous poſt where he is in hazard of being loſt.

All ſentinels are to be vigilant on their poſts; neither are they to ſing, ſmoke tobacco, nor ſuffer any noiſe to be made near them. They are to have a watchful eye over the things committed to their charge. They are not to ſuffer any light to remain, or any fire to be

Sentinel || Sepiaria.

made, near their poſts in the night-time; neither is any ſentry to be relieved or removed from his poſt but by the corporal of the guard. They are not to ſuffer any one to touch or handle their arms, or in the night-time to come within ten yards of their poſt.

No perſon is to ſtrike or abuſe a ſentry on his poſt; but when he has committed a crime, he is to be relieved, and then puniſhed according to the rules and articles of war.

A ſentinel, on his poſt in the night, is to know nobody but by the counter-ſign: when he challenges, and is anſwered, *Relief*, he calls out, *Stand, relief! advance, corporal!* upon which the corporal halts his men, and advances alone within a yard of the ſentry's fire-lock (firſt ordering his party to reſt, on which the ſentry does the ſame), and gives him the counter-ſign, taking care that no one hear it.

SEPIA, the CUTTLE-FISH, a genus of animals belonging to the claſs of vermes. See HELMINTHOLOGY *Index*.

The officinal cuttle affords the cuttle-bone of the ſhops, which was formerly uſed as an abſorbent. The bones are frequently flung on all our ſhores; the animal very rarely. The conger eels, it is ſaid, bite off their arms, or feet; but it is added they grow again, as does the lizard's tail (Plin. ix. 29.). They are preyed upon by the plaiſe. This fiſh emits (in common with the other ſpecies), when alarmed or purſued, the black liquor which the ancients ſuppoſed darkened the circumambient wave, and concealed it from the enemy.

The endanger'd cuttle thus evades his fears,
And native hoards of fluid ſafety bears.
A pitchy ink peculiar glands ſupply,
Whoſe ſhades the ſharpeſt beam of light deſy.
Purſu'd, he bids the ſable fountains flow,
And, wrapt in clouds, eludes th' impending foe.
The fiſh retreats unſeen, while ſelf-born night,
With pious ſhade befriends her parent's flight.

The ancients ſometimes made uſe of it inſtead of ink. Perſius mentions the ſpecies in his deſcription of the noble ſtudent.

Jam liber, et bicolor poſitis membrana capillis,
Inque manus chartæ, nodaſque venit arundo.
Tum querimur, craſſus calamo quod pendeat humor;
Nigra quod infuſa veneſcat ſepia lympha.
At length, his book he ſpreads, his pen he takes;
His papers here in learned order lays,
And there his parchment's ſmoother ſide diſplays.
But oh! what croſſes wait on ſtudious men!
The *cuttle's* juice hangs clotted at our pen.
In all my life ſuch ſtuff I never knew,
So gummy thick—Dilute it, it will do.
Nay, now 'tis water! DRYDEN.

This animal was eſteemed a delicacy by the ancients, and is eaten even at preſent by the Italians. Rondeletius gives us two receipts for the dreſſing, which may be continued to this day. Athenæus alſo leaves us the method of making an antique cuttle-fiſh ſauſage; and we learn from Ariſtotle, that thoſe animals are in higheſt ſeaſon when pregnant.

SEPIARIÆ, (from *ſepes*, "a hedge"), the name of the 44th order of Linnæus's Fragments of a Natural Method, conſiſting of a beautiful collection of woody plants, ſome of which, from their ſize and elegance, are very proper furniture for hedges. See BOTANY *Index*.

Seps || Septics.

SEPS, a ſpecies of LACERTA. See ERPETOLOGY *Index*.

SEPTARIÆ, in *Natural Hiſtory*, an old term for a variety of iron-ſtone, called alſo *ludus Helmontii*. This mineral is of a round compreſſed form, and is internally divided by ſepta or thin partitions of lime ſpar or pyrites; hence the name.

SEPTAS, a genus of plants belonging to the claſs of *Heptandria*; and in the natural ſyſtem ranged under the 13th order, *Succulentæ*. See BOTANY *Index*.

SEPTEMBER, the ninth month of the year, conſiſting of thirty days; it took its name as being the ſeventh month, reckoning from March, with which the Romans began their year.

SEPTENNIAL, any thing laſting ſeven years.

SEPTENNIAL Elections. Blackſtone, in his Commentaries, vol. i. p. 189. ſays, (after obſerving that the utmoſt extent of time allowed the ſame parliament to ſit by the ſtat. 6. W. and M. c. 2. was three years), "But, by the ſtatute 1 Geo. I. ſt. ſt. 2. c. 38. (in order *profeſſedly* to prevent the great and continued expences of frequent elections, and the violent heats and animoſities conſequent thereupon, and for the peace and ſecurity of the government, juſt then recovering from the late rebellion), this term was prolonged to ſeven years; and what alone is an inſtance of the vaſt authority of parliament, the very ſame houſe that was choſen for three years enacted its own continuance for ſeven."

SEPTENTRIO, in *Aſtronomy*, a conſtellation, more uſually called *urſa minor*.

In coſmography, the term *ſeptentrio* denotes the ſame with *north*: and hence ſeptentrional is applied to anything belonging to the north; as *ſeptentrional ſigns, parallels*, &c.

SEPTICS, are thoſe ſubſtances which promote putrefaction, chiefly the calcareous earths, magneſia, and teſtaceous powders. From the many curious experiments made by Sir John Pringle to aſcertain the *ſeptic* and *antiſeptic* virtues of natural bodies, it appears that there are very few ſubſtances of a truly *ſeptic* nature. Thoſe commonly reputed ſuch by authors, as the alkaline and volatile ſalts, he found to be no wiſe *ſeptic*. However, he diſcovered ſome, where it ſeemed leaſt likely to find any ſuch quality; theſe were chalk, comman ſalt, and teſtaceous powders. He mixed twenty grains of crabs eyes, prepared with ſix drams of ox's gall, and an equal quantity of water. Into another phial he put an equal quantity of gall and water, but no crabs-eyes. Both theſe mixtures being placed in the furnace, the putrefaction began much ſooner, where the powder was, than in the other phial. On making a like experiment with chalk, its *ſeptic* virtue was found to be much greater than that of the crabs-eyes: nay, what the doctor never met with before, in a mixture of two drams of fleſh, with two ounces of water and thirty grains of prepared chalk, the fleſh was reſolved into a perfect mucus in a few days.

To try whether the teſtaceous powders would alſo diſſolve vegetable ſubſtances, the doctor mixed them with barley and water, and compared this mixture with another of barley and water alone. After a long maceration

Septics || Septuagint.

ceration by a fire, the plain water was found to ſwell the barley, and turn mucilaginous and ſour; but that with the powder kept the grain to its natural ſize, and though it ſoftened it, yet made no mucilage, and remained ſweet.

Nothing could be more unexpected, than to find ſea ſalt a haſtener of putrefaction; but the fact is thus; one dram of ſalt preſerves two drams of freſh beef in two ounces of water, above thirty hours, uncorrupted, in a heat equal to that of the human body; or, which is the ſame thing, this quantity of ſalt keeps fleſh ſweet twenty hours longer than pure water; but then half a dram of ſalt does not preſerve it above two hours longer. Twenty-five grains have little or no antiſeptic virtue, and ten, fifteen, or even twenty grains, manifeſtly both haſten and heighten the corruption. The quantity which had the moſt putrefying quality, was found to be about ten grains to the above proportion of fleſh and water.

Many inferences might be drawn from this experiment: one is, that ſince ſalt is never taken in aliment beyond the proportion of the corrupting quantities, it would appear that it is ſubſervient to digeſtion chiefly by its *ſeptic* virtue, that is, by ſoftening and reſolving meats; an action very different from what is commonly believed.

It is to be obſerved, that the above experiments were made with the ſalt kept for domeſtic uſes. See Pringle's Obſerv. on the Diſeaſes of the army, p. 348, et ſeq.

SEPTIZON, or SEPTIZONIUM, in Roman antiquity, a celebrated mauſoleum, built by Septimius Severus, in the tenth region of the city of Rome: it was ſo called from *ſeptem* and *zona*, by reaſon it conſiſted of ſeven ſtories, each of which was ſurrounded by a row of columns.

SEPTUAGESIMA, in the kalendar, denotes the third Sunday before Lent, or before Quadrageſima Sunday: ſuppoſed by ſome to take its name from its being about ſeventy days before Eaſter.

SEPTUAGINT, the name given to a Greek verſion of the books of the Old Teſtament, from its being ſuppoſed to be the work of ſeventy Jews, who are uſually called the *ſeventy interpreters*, becauſe ſeventy is a round number.

The hiſtory of this verſion is expreſsly written by Ariſtæas, an officer of the guards to Ptolemy Philadelphus, the ſubſtance of whoſe account is as follows:—Ptolemy having erected a fine library at Alexandria, which he took care to fill with the moſt curious and valuable books from all parts of the world, was informed that the Jews had one containing the laws of Moſes, and the hiſtory of that people; and being deſirous of enriching his library with a Greek tranſlation of it, applied to the high-prieſt of the Jews; and to engage him to comply with his requeſt, ſet at liberty all the Jews whom his father Ptolemy Soter had reduced to ſlavery. After ſuch a ſtep, he eaſily obtained what he deſired; Eleazar the Jewiſh high-prieſt ſent back his ambaſſadors with an exact copy of the Moſaical law, written in letters of gold, and ſix elders of each tribe, in all ſeventy-two; who were received with marks of reſpect by the king, and then conducted into the iſle of Pharos, where they were lodged in a houſe prepared for their reception, and ſupplied with every thing neceſſary. They ſet about the tranſlation without loſs of time, and finiſhed it in ſeventy-two days; and the whole being read in the preſence of the king, he admired the profound wiſdom of the laws of Moſes: and ſent back the deputies laden with preſents, for themſelves, the high-prieſt, and the temple. Septuagint.

Ariſtobulus, who was tutor to Ptolemy Phyſcon, Philo who lived in our Saviour's time, and was contemporary with the apoſtles, and Joſephus, ſpeak of this tranſlation as made by ſeventy two interpreters, by the care of Demetrius Phalereus in the reign of Ptolemy Philadelphus. All the Chriſtian writers, during the firſt 15 centuries of the Chriſtian era, have admitted this account of the Septuagint as an undoubted fact. But ſince the reformation, critics have boldly called it in queſtion, becauſe it was attended with circumſtances which they think inconſiſtent, or, at leaſt, improbable. Du Pin has aſked, why were ſeventy-two interpreters employed, ſince twelve would have been ſufficient? Such an objection is trifling. We may as well aſk, why did King James I. employ fifty-four tranſlators in rendering the Bible into Engliſh, ſince Du Pin thinks twelve would have been ſufficient?

1. Prideaux objects, that the Septuagint is not written in the Jewiſh, but in the Alexandrian, dialect; and could not therefore be the work of natives of Paleſtine. But theſe dialects were probably at that time the ſame, for both Jews and Alexandrians had received the Greek language from the Macedonians about 50 years before.

2. Prideaux farther contends, that all the books of the Old Teſtament could not be tranſlated at the ſame time; for they exhibit great difference of ſtyle. To this it is ſufficient to reply, that they were the work of ſeventy-two men, each of whom had ſeperate portions aſſigned them.

3. The Dean alſo urges, that Ariſtæas, Ariſtobulus, Philo, and Joſephus, all directly tell us, that the law was tranſlated without mentioning any of the other ſacred books. But nothing was more common among writers of the Jewiſh nation than to give this name to the Scriptures as a whole. In the New Teſtament, law is uſed as ſynonymous with what we call the Old Teſtament. Beſides, it is expreſsly ſaid by Ariſtobulus, in a fragment quoted by Euſebius (*Præp. Evan.* l. 1.), that the whole Sacred Scripture was rightly tranſlated through the means of Demetrius Phalereus, and by the command of Philadelphus. Joſephus indeed, ſays the learned Dean, aſſerts, in the preface to his Antiquities, that the Jewiſh interpreters did not tranſlate for Ptolemy the whole Scriptures, but the law only. Here the evidence is contradictory, and we have to determine, whether Ariſtobulus or Joſephus be moſt worthy of credit. We do not mean, however, to accuſe either of forgery, but only to inquire which had the beſt opportunities of knowing the truth. Ariſtobulus was an Alexandrian Jew, tutor to an Egyptian king, and lived within 100 years after the tranſlation was made, and certainly had acceſs to ſee it in the royal library. Joſephus was a native of Paleſtine, and lived not until 300 years or more after the tranſlation was made, and many years after it was burnt along with the whole library of Alexandria in the wars of Julius Cæſar. Suppoſing the veracity of theſe two writers equal, as we have no proof of the contrary, which of them ought we to conſider as the beſt evidence? Ariſtobulus

Septuagint. ſtobulus ſurely. Prideaux, indeed, ſeems doubtful whether there was ever ſuch a man; and Dr Hody ſuppoſes that the Commentaries on the five books of Moſes, which bear the name of Ariſtobulus, were a forgery of the ſecond century. To prove the exiſtence of any human being, who lived 2000 years before us, and did not perform ſuch works as no mere man ever performed, is a taſk which we are not diſpoſed to undertake; and we believe it would not be leſs difficult to prove that Philo and Joſephus exiſted, than that ſuch a perſon as Ariſtobulus did not exiſt. If the writings which have paſſed under his name were a forgery of the ſecond century, it is ſurpriſing that they ſhould have impoſed upon Clemens Alexandrinus, who lived in the ſame century, and was a man of abilities, learning, and well acquainted with the writings of the ancients. Euſebius, too, in his *Præp. Evan.* quotes the Commentaries of Ariſtobulus. But, continues the learned Dean, "Clemens Alexandrinus is the firſt author that mentions them. Now, had any ſuch commentaries exiſted in the time of Philo and Joſephus, they would ſurely have mentioned them. But is the circumſtance of its not being quoted by every ſucceeding author a ſufficient reaſon to diſprove the authenticity of any book? Neither Philo nor Joſephus undertook to give a liſt of preceding authors, and it was by no means the uniform practice of theſe times always to name the authors from whom they derived their information."

4. Prideaux farther contends, that the ſum which Ptolemy is ſaid to have given to the interpreters is too great to be credible. If his computation were juſt, it certainly would be ſo. He makes it 2,000,000l. ſterling, but other writers * reduce it to 85,421l. and ſome to 56,947l.; neither of which is a ſum ſo very extraordinary in ſo great and magnificent a prince as Philadelphus, who ſpent, according to a paſſage in Athenæus (lib. v.), not leſs than 10,000 talents on the furniture of one tent; which is ſix times more than what was ſpent in the whole of the embaſſy and tranſlation, which amounted only to 1552 talents.

* *Blair's Lectures on the Canon.*

5. Prideaux ſays, "that what convicts the whole ſtory of Ariſteas of falſity is, that he makes Demetrius Phalereus to be the chief actor in it, and a great favourite of the king; whereas Philadelphus, as ſoon as his father was dead, caſt him into priſon, where he ſoon after died." But it may be replied, that Philadelphus reigned two years jointly with his father Lagus, and it is not ſaid by Hermippus that Demetrius was out of favour with Philadelphus during his father's life. Now, if the Septuagint was tranſlated in the beginning of the reign of Philadelphus, as Euſebius and Jerome think, the difficulty will be removed. Demetrius might have been librarian during the reign of Philadelphus, and yet impriſoned on the death of Lagus. Indeed, as the cauſe of Philadelphus's diſpleaſure was the advice which Demetrius gave to his father, to prefer the ſons of Arſinoë before the ſon of Bernice, he could ſcarcely ſhow it till his father's death. The Septuagint tranſlation might therefore be begun while Philadelphus reigned jointly with his father, but not be finiſhed till after his father's death.

Stillingfleet's Origines Sacræ.

6. Beſides the objections which have been conſidered, there is only one that deſerves notice. The ancient Chriſtians not only differ from one another concerning the time in which Ariſtobulus lived, but even contradict themſelves in different parts of their workt. Sometimes they tell us, he dedicated his book to Ptolemy Philometer, at other times they ſay, it was addreſſed to Philadelphus and his father. Sometimes they make him the ſame perſon who is mentioned in 2 Maccabees, chap 1. and ſometimes one of the 72 interpreters 152 years before. It is difficult to explain how authors fall into ſuch inconſiſtencies, but it is probably occaſioned by their quoting from memory. This was certainly the practice of almoſt all the early Chriſtian writers, and ſometimes of the apoſtles themſelves. Miſtakes were therefore inevitable. Joſephus has varied in the circumſtances of the ſame event, in his antiquities and wars of the Jews, probably from the ſame cauſe; but we do not hence conclude, that every circumſtance of ſuch a relation is entirely falſe. In the account of the Marquis of Argyle's death in the reign of Charles II. we have a very remarkable contradiction. Lord Clarendon relates, that he was condemned to be hanged, which was performed the ſame day: on the contrary, Burnet, Woodrow, Heath, Echard, concur in ſtating, that he was beheaded; and that he was condemned upon the Saturday and executed upon the Monday †. Was any reader of Engliſh hiſtory ever ſceptic enough to raiſe from hence a queſtion, whether the Marquis of Argyle was executed or not? Yet this ought to be left in uncertainty according to the way of reaſoning in which the facts reſpecting the tranſlation of the Septuagint is attempted to be diſproved.

Septuagint.

† *Biographia Britan.*

Prideaux's Connections. vol. iii. b. 1.

Such are the objections which the learned and ingenious Prideaux has raiſed againſt the common account of the Septuagint tranſlation, and ſuch are the anſwers which may be given to them. We have choſen to ſupport that opinion which is ſanctioned by hiſtorical evidence, in preference to the conjectures of modern critics however ingenious; being perſuaded, that there are many things recorded in hiſtory, which, though perfectly true, yet, from our imperfect knowledge of the concomitant circumſtances, may, at a diſtant period, ſeem liable to objections. To thoſe who require poſitive evidence, it may be ſtated thus. Ariſtæas, Ariſtobulus, Philo, and Joſephus, aſſure us, that the law was tranſlated. Taking the law in the moſt reſtricted ſenſe, we have at leaſt ſufficient authority to aſſert, that the Pentateuch was rendered into Greek under Ptolemy Philadelphus. Ariſtobulus affirms, that the whole Scriptures were tranſlated by the ſeventy-two. Joſephus confines their labours to the books of Moſes. He therefore who cannot determine to which of the two the greateſt reſpect is due, may ſuſpend his opinion. It is certain, however, that many of the other books were tranſlated before the age of our Saviour; for they are quoted both by him and his apoſtles: and, perhaps, by a minute examination of ancient authors, in the ſame way that Dr Lardner has examined the Chriſtian fathers to prove the antiquity of the New Teſtament, the preciſe period in which the whole books of the Septuagint were compoſed might, with conſiderable accuracy, be aſcertained.

For 400 years this tranſlation was in high eſtimation with the Jews. It was read in their ſynagogues in preference to the Hebrew; not only in thoſe places where Greek was the common language, but in many ſynagogues of Jeruſalem and Judea. But when they ſaw that it was equally valued by the Chriſtians, they became

Septuagint. came jealous of it, and at length, in the ſecond century, Aquila, an apoſtate Chriſtian, attempted to ſubſtitute another Greek tranſlation in its place. In this work he was careful to give the ancient prophecies concerning the Meſſiah a different turn from the Septuagint, that they might not be applicable to Chriſt. In the ſame deſign he was followed by Symmachus and Theodotion, who alſo, as St Jerome informs us, wrote out of hatred to Chriſtianity.

In the mean time, the Septuagint, from the ignorance, boldneſs, and careleſſneſs of tranſcribers, became full of errors. To correct theſe, Origen publiſhed a new edition in the beginning of the third century, in which he placed the tranſlations of Aquila, Symmachus, and Theodotion. This edition was called *Tetrapla*, the tranſlations being arranged oppoſite to one another in four columns. He alſo added one column, containing the Hebrew text in Hebrew letters, and another exhibiting it in Greek. In a ſecond edition he publiſhed two additional Greek verſions; one of which was found at Nicopolis, and the other at Jericho; this was called the *Hexapla*. By comparing ſo many tranſlations, Origen endeavoured to form a correct copy of the Scriptures. Where they all agreed, he conſidered them right. The paſſages which he found in the LXX, but not in the Hebrew text, he marked with an obeliſk: what he found in the Hebrew, but not in the LXX, he marked with an aſteriſk. St Jerome ſays, that the additions which Origen made to the LXX, and marked with an aſteriſk, were taken from Theodotion. From this valuable work of Origen the verſion of the LXX was tranſcribed in a ſeparate volume, with the aſteriſks and obeliſks for the uſe of the churches; and from this circumſtance the great work itſelf was neglected and loſt.

About the year 300 two new editions of the LXX were publiſhed; the one by Heſychius an Egyptian biſhop, and the other by Lucian a preſbyter of Antioch. But as theſe authors did not mark with any note of diſtinction the alterations which they had made, their edition does not poſſeſs the advantages of Origen's.

The beſt edition of the LXX is that of Dr Grabe, which was publiſhed in the beginning of the preſent century. He had acceſs to two MSS, nearly of equal antiquity, the one found in the Vatican library at Rome, the other in the royal library at St James's, which was preſented to Charles I. by Cyril, patriarch of Alexandria, and hence is commonly called the *Alexandrian MS.* Anxious to diſcover which of theſe was according to the edition of Origen, Dr Grabe collected the fragments of the Hexapla, and found they agreed with the Alexandrian MS. but not with the Vatican where it differed with the other. Hence he concluded that the Alexandrian MS. was taken from the edition of Origen. By comparing the quotations from ſcripture in the works of Athanaſius and St Cyril (who were patriarchs of Alexandria at the time St Jerome ſays Heſychius's edition of the LXX was there uſed) with the Vatican MS. he found they agreed ſo well that he juſtly inferred that that MS. was taken from the edition of Heſychius.

This verſion was in uſe to the time of our bleſſed Saviour, and is that out of which moſt of the citations in the New Teſtament, from the Old, are taken. It was alſo the ordinary and canonical tranſlation made uſe of by the Chriſtian church in the earlieſt ages; and it ſtill ſubſiſts in the churches both of the eaſt and weſt. Septuagint || Sepulchre.

Thoſe who deſire a more particular account of the Septuagint tranſlations may conſult Hody *de Bibliorum Textibus*, Prideaux's Connections, Owen's Inquiry into the Septuagint Verſion, Blair's Lectures on the Canon, and Michaelis's Introduction to the New Teſtament, laſt edition.

SEPTUAGINT Chronology, the chronology which is formed from the dates and periods of time mentioned in the Septuagint tranſlation of the Old Teſtament. It reckons 1500 years more from the creation to Abraham than the Hebrew bible. Dr Kennicot, in the diſſertation prefixed to his Hebrew bible, has ſhown it to be very probable that the chronology of the Hebrew ſcriptures, ſince the period juſt mentioned, was corrupted by the Jews, between the years 175 and 200, and that the chronology of the Septuagint is more agreeable to truth. It is a fact, that during the ſecond and third centuries the Hebrew ſcriptures were almoſt entirely in the hands of the Jews, while the Septuagint was confined to the Chriſtians. The Jews had therefore a very favourable opportunity for this corruption. The following is the reaſon which is given by oriental writers: It being a very ancient tradition, that the Meſſiah was to come in the ſixth chiliad, becauſe he was to come in the laſt days (founded on a myſtical application of the ſix days creation), the contrivance was *to ſhorten the age of the world from about* 5500 *to* 3760; *and thence to prove that Jeſus could not be the Meſſiah.* Dr Kennicot adds, that ſome Hebrew copies having the larger chronology were extant till the time of Euſebius, and ſome till the year 700.

SEPTUM, in *Anatomy*, an incloſure or partition; a term applied to ſeveral parts of the body, which ſerve to ſeparate one part from another; as, *ſeptum narium*, or partition between the noſtrils, &c.

SEPULCHRAL, ſomething belonging to ſepulchres or tombs: thus a ſepulchral column is a column erected over a tomb, with an inſcription on its ſhaft; and ſepulchral lamps, thoſe ſaid to have been found burning in the tombs of ſeveral martyrs and others. See Lamp.

SEPULCHRE, a tomb or place deſtined for the interment of the dead. This term is chiefly uſed in ſpeaking of the burying-places of the ancients, thoſe of the moderns being uſually called *tombs*.

Sepulchres were held ſacred and inviolable; and the care taken of them has always been held a religious duty, grounded on the fear of God, and the belief of the ſoul's immortality. Thoſe who have ſearched or violated them have been thought odious by all nations, and were always ſeverely puniſhed.

The Egyptians called ſepulchres *eternal houſes*, in contradiſtinction to their ordinary houſes or palaces, which they called *inns*, on account of their ſhort ſtay in the one in compariſon of their long abode in the other. See Tomb.

Regular Canons of St SEPULCHRE, a religious order, formerly inſtituted at Jeruſalem, in honour of the holy ſepulchre, or the tomb of Jeſus Chriſt.

Many of theſe canons were brought from the Holy Land into Europe, particularly into France, by Louis the Younger; into Poland, by Jaxa, a Poliſh gentleman; and into Flanders, by the counts thereof; many

alſo

Sepulchre of Sequeſtration.

alſo came into England. This order was, however, ſuppreſſed by Pope Innocent VIII. who gave its revenues and effects to that of our Lady of Bethlehem: which alſo becoming extinct, they were beſtowed on the knights of St John of Jeruſalem. But the ſuppreſſion did not take effect in Poland, where they ſtill ſubſiſt, as alſo in ſeveral provinces of Germany. Theſe canons follow the rule of St Auguſtine.

Knights of the Holy SEPULCHRE, a military order, eſtabliſhed in Paleſtine about the year 1114.

The knights of this order in Flanders choſe Philip II. king of Spain, for their maſter, in 1558, and afterwards his ſon; but the grand-maſter of the order of Malta prevailed on the laſt to reſign; and, when afterwards the duke of Nevers aſſumed the ſame quality in France, the ſame grand-maſter, by his intereſt and credit, procured a like renunciation of him, and a confirmation of the union of this order to that of Malta.

SEQUANI, a people anciently forming a part of Gallia Celtica, but annexed to Belgica by Auguſtus, ſeparated from the Helvetii by Mount Jura, with the Rhine on the eaſt (Strabo), bordering on the Ædui and Seguſtiano to the ſouth, and Lingones to the weſt (Tacitus). Now Franche Comte.

SEQUESTRATION, in *Common Law*, is ſetting aſide the thing in controverſy from the poſſeſſion of both the parties that contend for it. In which ſenſe it is either voluntary, as when done by the conſent of the parties; or neceſſary, as where it is done by the judge, of his own authority, whether the parties will or not.

SEQUESTRATION, in the *Civil Law*, is the act of the ordinary, diſpoſing of the goods and chattels of one deceaſed, whoſe eſtate no man will meddle with.

A widow is alſo ſaid to ſequeſter, when ſhe diſclaims having any thing to do with the eſtate of her deceaſed huſband.

Among the Romaniſts, in queſtions of marriage, where the wife complains of impotency in the huſband, ſhe is to be ſequeſtered into a convent, or into the hands of matrons, till the proceſs be determined.

SEQUESTRATION is alſo uſed for the act of gathering the fruits of a benefice void, to the uſe of the next incumbent.

Sometimes a benefice is kept under ſequeſtration for many years, when it is of ſo ſmall value, that no clergyman fit to ſerve the cure will be at the charge of taking it by inſtitution; in which caſe the ſequeſtration is committed either to the curate alone, or to the curate and church-wardens jointly. Sometimes the profits of a living in controverſy, either by the conſent of the parties, or the judge's authority, are ſequeſtered and placed for ſafety in a third hand, till the ſuit is determined, a miniſter being appointed by the judge to ſerve the cure, and allowed a certain ſalary out of the profits. Sometimes the profits of a living are ſequeſtered for neglect of duty, for dilapidations, or for ſatisfying the debts of the incumbent.

SEQUESTRATION, in chancery, is a commiſſion uſually directed to ſeven perſons therein named, empowering them to ſeize the defendant's perſonal eſtate, and the profits of his real, and to detain them, ſubject to the order of the court. It iſſues on the return of the ſerjeant at arms, wherein it is certified, that the defendant had ſecreted himſelf. Sequeſtration

Sequeſtrations were firſt introduced by Sir Nicholas Bacon, lord keeper in the reign of Queen Elizabeth; before which the court found ſome difficulty in enforcing its proceſs and decrees; and they do not ſeem to be in the nature of proceſs to bring in the defendant, but only intended to enforce the performance of the court's decree. Sequeſtration Sequin.

A ſequeſtration is alſo made, in London, upon an action of debt; the courſe of proceeding in which caſe is this: The action being entered, the officer goes to the defendant's ſhop or warehouſe, when no perſon is there, and takes a padlock, and hangs it on the door, uttering theſe words: "I do ſequeſter this warehouſe, and the goods and merchandiſe therein, of the defendant in this action, to the uſe of the plaintiff," &c. after which he ſets on his ſeal, and makes a return of the ſequeſtration in the compter; and four days being paſſed after the return made, the plaintiff may, at the next court, have judgment to open the ſhop or warehouſe, and to have the goods appraiſed by two freemen, who are to be ſworn at the next court held for that compter; and then the ſerjeant puts his hand to the bill of appraiſement, and the court grants judgment thereon; but yet the defendant may put in bail before ſatisfaction, and by that means diſſolve the ſequeſtration; and after ſatisfaction, may put in bail to diſprove the debt, &c.

In the time of the civil wars, ſequeſtration was uſed for a ſeizing of the eſtates of delinquents for the uſe of the commonwealth.

SEQUESTRATION, in *Scots Law*. See LAW *Index*.

SEQUIN, a gold coin, ſtruck at Venice, and in ſeveral parts of the Grand Signior's dominions. In Turkey, it is called *dakob*, or piece of gold, and according to Volney is in value about 6s. 3d. ſterling. It varies, however, conſiderably in its value in different countries. At Venice it is equal to about 9s. 2d. ſterling.

The Venetian ſequins are in great requeſt in Syria, from the fineneſs of their ſtandard, and the practice they have of employing them for women's trinkets. The faſhion of theſe trinkets does not require much art; the piece of gold is ſimply pierced, in order to ſuſpend it by a chain, likewiſe of gold, which flows upon the breaſt. The more ſequins that are attached to this chain, and the greater the number of theſe chains, the more is a woman thought to be ornamented. This is the favourite luxury, and the emulation of all ranks. Even the female peaſants, for want of gold, wear piaſtres or ſmaller pieces; but the women of a certain rank diſdain ſilver; they will accept of nothing but ſequins of Venice, or large Spaniſh pieces, and cruſadoes. Some of them wear 260 or 300, as well lying flat, as ſtrung one on another, and hung near the forehead, at the edge of the head dreſs. It is a real load: but they do not think they can pay too dearly for the ſatisfaction of exhibiting this treaſure at the public bath, before a crowd of rivals, to awaken whoſe jealouſy conſtitutes their chief pleaſure. The effect of this luxury on commerce, is the withdrawing conſiderable ſums from circulation, which remain dead; beſides, that when any of theſe pieces return into common uſe, having loſt their

Seraglio. their weight by being pierced, it becomes neceſſary to weigh them. The practice of weighing money is general in Syria, Egypt, and all Turkey. No piece, however effaced, is refuſed there; the merchant draws out his ſcales and weighs it, as in the days of Abraham, when he purchaſed his ſepulchre. In conſiderable payments, an agent of exchange is ſent for, who counts paras by thouſands, rejects a great many pieces of falſe money, and weighs all the ſequins, either ſeparately or together.

SERAGLIO, formed from the Perſian word *ſeraw*, or Turkiſh word *ſarai*, which ſignifies a houſe, and is commonly uſed to expreſs the houſe or palace of a prince. In this ſenſe it is frequently uſed at Conſtantinople; the houſes of foreign ambaſſadors are called *ſeraglios*. But it is commonly uſed by way of eminence for the palace of the grand ſignior at Conſtantinople, where he keeps his court, and where his concubines are lodged, and where the youth are trained up for the chief poſts of the empire.

It is a triangle about three Italian miles round, wholly within the city, at the end of the promontory Chryſoceras, now called the *Seraglio Point*. The buildings run back to the top of the hill, and from thence are gardens that reach to the edge of the ſea. It is incloſed with a very high and ſtrong wall, upon which there are ſeveral watch towers: and it has many gates, ſome of which open towards the ſea ſide, and the reſt into the city; but the chief gate is one of the latter, which is conſtantly guarded by a company of capoochees, or porters; and in the night it is well guarded towards the ſea. The outward appearance is not very beautiful, the architecture being irregular, conſiſting of ſeparate edifices in the form of pavilions and domes.

The ladies of the ſeraglio are a collection of beautiful young women, chiefly ſent as preſents from the provinces and the Greek iſlands, moſt of them the children of Chriſtian parents. The brave prince Heraclius hath for ſome years paſt aboliſhed the infamous tribute of children of both ſexes, which Georgia formerly paid every year to the Porte. The number of women in the harem depends on the taſte of the reigning monarch or ſultan. Selim had 2000, Achmet had but 300, and his ſucceſſor had nearly 1600. On their admiſſion they are committed to the care of old ladies, taught ſewing and embroidery, muſic, dancing, and other accompliſhments, and furniſhed with the richeſt clothes and ornaments. They all ſleep in ſeparate beds, and between every fifth there is a preceptreſs. Their chief governeſs is called *Katon Kiaga*, or governeſs of the noble young ladies. There is not one ſervant among them, for they are obliged to wait on one another by rotation; the laſt that is entered ſerves her who preceded her and herſelf. Theſe ladies are ſcarcely ever ſuffered to go abroad, except when the grand ſignior removes from one place to another, when a troop of black eunuchs conveys them to the boats, which are incloſed with lattices and linen curtains; and when they go by land they are put into cloſe chariots, and ſignals are made at certain diſtances, to give notice that none approach the roads through which they march. The boats of the harem, which carry the grand ſignior's wives, are manned with 24 rowers, and have white covered tilts, ſhut alternately by Venetian blinds. Among the emperor's attendants are a number of mutes, who act and converſe by ſigns with great quickneſs, and ſome dwarfs, who are exhibited for the diverſion of his Majeſty. Seraglio.

When he permits the women to walk in the gardens of the ſeraglio, all people are ordered to retire, and on every ſide there is a guard of black eunuchs, with ſabres in their hands, while others go their rounds in order to hinder any perſon from ſeeing them. If, unfortunately, any one is found in the garden, even through ignorance or inadvertence, he is undoubtedly killed, and his head brought to the feet of the grand ſignior, who gives a great reward to the guard for their vigilance. Sometimes the grand ſignior paſſes into the gardens to amuſe himſelf when the women are there; and it is then that they make uſe of their utmoſt efforts, by dancing, ſinging, ſeducing geſtures, and amorous blandiſhments, to enſnare the affections of the monarch. It is not permitted that the monarch ſhould take a virgin to his bed, except during the ſolemn feſtivals, and on occaſion of ſome extraordinary rejoicings, or the arrival of ſome good news. Upon ſuch occaſions, if the ſultan chooſe a new companion to his bed, he enters into the apartment of the women, who are ranged in files by the governeſſes, to whom he ſpeaks, and intimates the perſon he likes beſt: the ceremony of the handkerchief, which the grand ſignior is ſaid to throw to the girl that he elects, is an idle tale, without any foundation. As ſoon as the grand ſignior has choſen the girl that he has deſtined to be the partner of his bed, all the others follow her to the bath, waſhing and perfuming her, and dreſſing her ſuperbly, conducting her ſinging, dancing, and rejoicing, to the bed-chamber of the grand ſignior, who is generally, on ſuch an occaſion, already in bed. Scarcely has the new-elected favourite entered the chamber, introduced by the grand eunuch who is upon guard, than ſhe kneels down, and when the ſultan calls her, ſhe creeps into bed to him by the foot of the bed, if the ſultan does not order her, by eſpecial grace, to approach by the ſide: after a certain time, upon a ſignal given by the ſultan, the governeſs of the girls, with all her ſuite, enters the apartment, and takes her back again, conducting her with the ſame ceremony to the women's apartments; and if by good fortune ſhe becomes pregnant, and is delivered of a boy, ſhe is called *aſaki ſultaneſs*, that is to ſay, ſultaneſs-mother; for the firſt ſon ſhe has the honour to be crowned, and ſhe has the liberty of forming her court. Eunuchs are alſo aſſigned for her guard, and for her particular ſervice. No other ladies, though delivered of boys, are either crowned or maintained with ſuch coſtly diſtinction as the firſt; however, they have their ſervice apart, and handſome appointments. After the death of the ſultan, the mothers of the male children are ſhut up in the old ſeraglio, from whence they can never come out any more, unleſs any of their ſons aſcend the throne. Baron de Tott informs us, that the female ſlave who becomes the mother of a ſultan, and lives long enough to ſee her ſon mount the throne, is the only woman who at that period alone acquires the diſtinction of *ſultana-mother;* ſhe is till then in the interior of her priſon with her ſon. The title of *bache kadun*, principal woman, is the firſt dignity of the grand ſignior's harem; and ſhe has a larger allowance

Seraglio. allowance than thoſe who have the title of ſecond, third, and fourth woman, which are the four free women the Koran allows.

This is a deſcription of the grand ſignior's ſeraglio: we ſhall now add an account of the ſeraglio or *harem*, as it is often called, of the emperor of Morocco, from the very intereſting tour of Mr Lempriere. This gentleman being a ſurgeon by profeſſion, was admitted into the harem to preſcribe for ſome of the ladies who were indiſpoſed, and was therefore enabled to give a particular account of this female priſon, and, what is ſtill more curious, of the manners and behaviour of its inhabitants.

The harem forms a part of the palace. The apartments, which are all on the ground floor, are ſquare, very lofty, and four of them incloſe a ſpacious ſquare court, into which they open by means of large folding doors. In the centre of theſe courts, which are floored with blue and white chequered tiling, is a fountain, ſupplied by pipes from a large reſervoir on the outſide of the palace, which ſerves for the frequent ablutions recommended by the Mahometan religion, as well as for other purpoſes. The whole of the harem conſiſts of about twelve of theſe ſquare courts, communicating with each other by narrow paſſages, which afford a free acceſs from one part of it to another, and of which all the women are allowed to avail themſelves.

The apartments are ornamented on the outſide with beautiful carved wood. In the inſide moſt of the rooms are hung with rich damaſk of various colours; the floors are covered with beautiful carpets, and there are matreſſes diſpoſed at different diſtances, for the purpoſes of ſitting and ſleeping.

Beſides theſe, the apartments are furniſhed at each extremity with an elegant European mahogany bedſtead, hung with damaſk, having on it ſeveral mattreſſes placed one over the other, which are covered with various coloured ſilks; but theſe beds are merely placed there to ornament the room. In all the apartments, without exception, the ceiling is wood, carved and painted. The principal ornaments in ſome were large and valuable looking-glaſſes, hung on different parts of the walls. In others, clocks and watches of different ſizes, in glaſs caſes, were diſpoſed in the ſame manner.

The ſultana Lalla Batoom and another favourite were indulged with a whole ſquare to themſelves; but the concubines were only each allowed a ſingle room.

Each female had a ſeparate daily allowance from the emperor, proportioned to the eſtimation in which they were held by him. The late emperor's allowance was very trifling: Lalla Douyaw, the favourite ſultana, had very little more than half-a-crown Engliſh a-day, and the others leſs in proportion. It muſt be allowed, that the emperor made them occaſional preſents of money, dreſs, and trinkets; but this could never be ſufficient to ſupport the number of domeſtics and other expences they muſt incur. Their greateſt dependence therefore was on the preſents they received from thoſe Europeans and Moors who viſited the court, and who employed their influence in obtaining ſome particular favour from the emperor. This was the moſt ſucceſsful mode that could be adopted. When Mr Lempriere was at Morocco, a Jew, deſirous of obtaining a very advantageous favour from the emperor, for which he had been a long time unſucceſsfully ſoliciting, ſent to all the principal ladies of the harem preſents of pearls to a very large amount; the conſequence was, that they all went in a body to the emperor, and immediately obtained the wiſhed-for conceſſion. Seraglio.

The ladies ſeparately furniſh their own rooms, hire their own domeſtics, and, in fact, do what they pleaſe in the harem, but are not permitted to go out without an expreſs order from the emperor, who very ſeldom grants them that favour, except when they are to be removed from one palace to another. In that caſe, a party of ſoldiers is diſpatched a little diſtance before them, to diſperſe the male paſſengers in particular, and to prevent the poſſibility of their being ſeen. This previous ſtep being taken, a piece of linen cloth is tied round the lower part of the face, and afterwards theſe miſerable females cover themſelves entirely with their haicks, and either mount mules, which they ride like men, or, what is more uſual, are put into a ſquare carriage or litter, conſtructed for this purpoſe, which by its lattice-work allows them to ſee without being ſeen. In this manner they ſet off, under the charge of a guard of black eunuchs. This journey, and ſometimes a walk within the bounds of the palace, with which they are, however, ſeldom indulged, is the only exerciſe they are permitted to take.

The late emperor's harem conſiſted of between 60 and 100 females, beſides their domeſtics and ſlaves, which were very numerous. Many of the concubines were Mooriſh women, who had been preſented to the emperor, as the Moors conſider it an honour to have their daughters in the harem; ſeveral were European ſlaves, who had either been made captives, or purchaſed by the emperor; and ſome were Negroes.

In this group the Europeans, or their deſcendants, had by far the greateſt claim to the character of handſome. There was one in particular, who was a native of Spain, and taken into the harem at about the ſame age as Lalla Douyaw, who was indeed a perfect beauty. Nor was this lady quite ſingular in that reſpect, for many others were almoſt equally handſome.

The eunuchs, who have the entire charge of the women, and who in fact live always among them, are the children of Negro ſlaves. They are generally either very ſhort and fat, or elſe tall, deformed, and lame. Their voices have that particular tone which is obſervable in youths who are juſt arriving at manhood; and their perſons altogether afford a diſguſting image of weakneſs and effeminacy.

The ſame gentleman gives us a very curious account of the manners and ignorance of theſe immured females, from his own obſervation, when viſiting the prince's harem. "Attended by an eunuch (ſays he), after paſſing the gate of the harem, which is always locked, and under the care of a guard of eunuchs, we entered a narrow and dark paſſage, which ſoon brought us to the court, into which the women's chambers open. We here ſaw numbers of both black and white women and children; ſome concubines, ſome ſlaves, and others hired domeſtics.

"Upon their obſerving the unuſual figure of an European, the whole multitude in a body ſurrounded me, and expreſſed the utmoſt aſtoniſhment at my dreſs and appearance. Some ſtood motionleſs, with their hands lifted up, their eyes fixed, and their mouths open, in

Seraglio. the uſual attitude of wonder and ſurpriſe. Some burſt into immoderate fits of laughter; while others again came up, and with uncommon attention eyed me from head to foot. The parts of my dreſs which ſeemed moſt to attract their notice were my buckles, buttons, and ſtockings; for neither men nor women in this country wear any thing of the kind. With reſpect to the club of my hair, they ſeemed utterly at a loſs in what view to conſider it; but the powder which I wore they conceived to be employed for the purpoſe of deſtroying vermin. Moſt of the children, when they ſaw me, ran away in the moſt perfect conſternation; and on the whole, I appeared as ſingular an animal, and I dare ſay had the honour of exciting as much curioſity and attention, as a lion or man-tiger juſt imported from abroad, and introduced into a country town in England on a market-day. Every time I viſited the harem, I was ſurrounded and laughed at by this curious mob, who, on my entering the gate, followed me cloſe to the very chamber to which I was proceeding, and on my return univerſally eſcorted me out.

"The greateſt part of the women were uncommonly fat and unwieldy; had black and full eyes, round faces, with ſmall noſes. They were of different complexions; ſome very fair, ſome ſallow, and others again perfect Negroes.

"One of my new patients being ready to receive me, I was deſired to walk into her room; where, to my great ſurpriſe, I ſaw nothing but a curtain drawn quite acroſs the apartment, ſimilar to that of a theatre which ſeparates the ſtage from the audience. A female domeſtic brought a very low ſtool, placed it near the curtain, and told me I was to ſit down there, and feel her miſtreſs's pulſe.

"The lady, who had by this time ſummoned up courage to ſpeak, introduced her hand from the bottom of the curtain, and deſired me to inform her of all her complaints, which ſhe conceived I might perfectly do by merely feeling the pulſe. It was in vain to aſk her where her pain was ſeated, whether in her ſtomach, head, or back; the only anſwer I could procure was a requeſt to feel the pulſe of the other hand, and then point out the ſeat of the diſeaſe, and the nature of the pain.

"Having neither ſatisfied my curioſity by exhibiting her face, nor made me acquainted with the nature of her complaint, I was under the neceſſity of informing her in poſitive terms, that to underſtand the diſeaſe it was abſolutely neceſſary to ſee the tongue as well as to feel the pulſe; and that without it I could do nothing for her. My eloquence, or rather that of my Jewiſh interpreter, was, however, for a long time exerted in vain; and I am perſuaded ſhe would have diſmiſſed me without any further inquiry, had not her invention ſupplied her with a happy expedient to remove her embarraſſment. She contrived at laſt to cut a hole through the curtain, through which ſhe extruded her tongue, and thus complied with my injunction as far as it was neceſſary in a medical view, but moſt effectually diſappointed my curioſity.

"I was afterwards ordered to look at another of the prince's wives, who was affected with a ſcrophulous ſwelling in her neck. This lady was, in the ſame manner as the other, at firſt excluded from my ſight; but as ſhe was obliged to ſhow me her complaint, I had an opportunity of ſeeing her face, and obſerved it to be very handſome." Seraglio & Serapis.

It is curious to obſerve the ſtrange and childiſh notions of perſons who have been wholly ſecluded from the world. All the ladies of the harem expected that our author ſhould have inſtantly diſcovered their complaints upon feeling the pulſe, and that he could cure every diſeaſe inſtantaneouſly. He found them proud and vain of their perſons, and extremely ignorant. "Among many ridiculous queſtions, they aſked my interpreter (ſays Mr Lempriere) if I could read and write; upon being anſwered in the affirmative, they expreſſed the utmoſt ſurpriſe and admiration at the abilities of the Chriſtians. There was not one among them who could do either; theſe rudiments of learning are indeed only the lot of a few of their men, who on that account are named *Talbs*, or explainers of the Mahometan law."

It is melancholy to reflect on the ſituation of theſe unfortunate women. Being conſidered as the mere inſtruments of pleaſure, no attention is paid to the improvement of their minds. They have no employment to occupy their time. Their needle-work is performed by Jeweſſes; their food is dreſſed, and their chambers taken care of, by ſlaves and domeſtics. They have no amuſement but a rude and barbarous kind of melancholy muſic, without melody, variety, or taſte; and converſation with one another, which muſt indeed be very confined, uniform, and inanimate, as they never ſee a new object. Excluded from the enjoyment of freſh air and exerciſe, ſo neceſſary for the ſupport of health and life; deprived of all ſociety but that of their fellow ſufferers, a ſociety to which moſt of them would prefer ſolitude itſelf; they are only to be conſidered as the moſt abject of ſlaves—ſlaves to the vices and caprice of a licentious tyrant, who exacts even from his wives themſelves a degree of ſubmiſſion and reſpect which borders upon idolatry, and which God and nature never meant ſhould be paid to a mortal.

SERAI, a building on the high-road, or in large cities in India, erected for the accommodation of travellers.

SERAPH, or SERAPHIM, ſpirits of the higheſt rank in the hierarchy of angels; who are thus called from their being ſuppoſed to be moſt inflamed with divine love, by their nearer and more immediate attendance at the throne of God, and to communicate their fervour to the remoter and inferior orders. Seraphim is the Hebrew plural of ſeraph. See ANGEL.

SERAPHIC, burning or inflamed with love or zeal, like a ſeraphim: thus St Bonaventure is called the *ſeraphic doctor*, from his abundant zeal and fervour.

SERAPIAS, a genus of plants belonging to the claſs of gynandria; and in the natural ſyſtem arranged under the ſeventh order *Orchideæ*. See BOTANY *Index*.

SERAPION, a phyſician of Alexandria. He and Philinus of the iſle of Cos were both ſcholars of Herophilus, and were founders of the empiric ſect; which happened about 287 B. C.

SERAPIS, in *Mythology*, an Egyptian deity, who was worſhipped under various names and attributes, as, the tutelary god of Egypt in general, and as the patron of ſeveral of their principal cities. Tacitus informs us, that he was worſhipped as a kind of univerſal deity that repreſented Eſculapius, Oſiris, Jupiter, and Pluto; and he

Serapis || Serene.

he was ſometimes taken for Jupiter Ammon, the Sun, and Neptune: and the honours that were rendered to him at Alexandria were more ſolemn and extraordinary than thoſe of any other place.

Plutarch and Clemens of Alexandria, as well as Tacitus *, inform us, that while the firſt Ptolemy was employed in fortifying Alexandria with walls, adorning it with temples and ſtately buildings, there appeared to him in his ſleep a young man of extraordinary beauty, of a ſtature more than human, admoniſhing him to diſpatch into Pontus ſome of his moſt truſty friends to bring from thence his ſtatue: he aſſured him, that the city and kingdom which poſſeſſed it ſhould prove happy, glorious, and powerful. The young man having thus ſpoken, diſappeared, mounting up into heaven in a blaze of fire.

* *Tac. Hiſt.* lib. iv. cap. 3. *Plut. de Iſide et Oſiride. Clem. Alex. in Protrep.*

Ptolemy diſcovered his viſion to the prieſts; but finding them ignorant of Pontus, he had recourſe to an Athenian, who informed him that near Sinope, a city of Pontus, there was a temple much reſorted to by the natives, which was conſecrated to Pluto, where he had a ſtatue, near which ſtood that of a woman. Ptolemy, neglecting the injunctions of the apparition, it again appeared to him in a menacing attitude; and the king immediately diſpatched ambaſſadors to the Serapian monarch, loaded with preſents. The king of Sinope conſented; but his ſubjects oppoſed the removal of the ſtatue. The god, however, of his own accord, as we are informed, conveyed himſelf to the ambaſſador's ſhip, and in three days landed in Alexandria. The ſtatue of Serapis was erected in one of the ſuburbs of the city, where a magnificent temple was afterwards reared.

The ſtatue of Serapis, according to Macrobius, was of a human form, with a baſket or buſhel on his head, ſignifying plenty; his right hand leaned on the head of a ſerpent, whoſe body was wound round a figure with three heads, of a dog, a lion, and a wolf; in his left hand he held a meaſure of a cubit length, as it were to take the height of the waters of the Nile. The figure of Serapis is found on many ancient medals.

The famous temple of Serapis at Alexandria was deſtroyed by order of Theodoſius; and the celebrated ſtatue of this deity was broken in pieces, and its limbs carried firſt in triumph by the Chriſtians through the city, and then thrown into a fierce fire, kindled for that purpoſe in the amphitheatre. As the Egyptians aſcribed the overflowing of the Nile, to which was owing the fertility of their country, to the benign influence of their god Serapis, they concluded, that now he was deſtroyed, the river would no longer overflow, and that a general famine would enſue; but when they obſerved, on the contrary, that the Nile ſwelled to a greater height than had been known in the memory of man, and thereby produced an immenſe plenty of all kinds of proviſions, many of the pagans renouncing the worſhip of idols, adored the God of the Chriſtians.

SERENA GUTTA, the ſame as *amauroſis*. See MEDICINE, N° 360.

SERENADE, a kind of concert given in the night by a lover to his miſtreſs, under her window. Theſe ſometimes only conſiſt of inſtrumental muſic, but at other times voices are added: the muſic and ſongs compoſed for theſe occaſions are alſo called *ſerenades*.

SERENE, a title of honour given to ſeveral princes and to the principal magiſtrates of republics. The king of Britain, the republic and doge of Venice, and the children of the king of Spain, are called *moſt ſerene*; and when the pope or the ſacred college write to the emperor, to kings, or to the doge, they give them no other title. In like manner, the emperor gives no other title to any king, except to the king of France.

Serene || Serge.

SERENUS, SAMMONICUS, a celebrated phyſician in the reigns of the emperors Severus and Caracalla, in and about the year 200. He wrote ſeveral treatiſes on hiſtory and the works of nature; but there is only one of them extant, which is a very indifferent poem on the Remedies of Diſeaſes. He was murdered at a feſtival by the order of Caracalla. He had a library that contained 62,000 volumes, which Quintus Serenus Sammonicus his ſon gave to Gordian the Younger, to whom he was preceptor.

SERES (Ptolemy); a people of the Farther Aſia; bounded on the weſt by Scythia extra Imaum; on the north and eaſt, by Terra Incognita; and on the ſouth, by India extra Gangem. According to theſe limits, their country anſwers nearly to Cathoy or North China. Other authors vary greatly in placing them, though the generality agree in placing them far to the eaſt. Mela places them between the Indi and Scythæ; and perhaps beyond the Indi, if we diſtinguiſh the Sinæ from them. The ancients commend them for their cotton manufactures, different from the produce of the bombyces or ſilk-worms, called *ſeres* by the Greeks; whence *ſerica*, "ſilk."

SERGE, a woollen quilted ſtuff, manufactured on a loom with four treddles, after the manner of rateens, and other ſtuffs that have the whale. The goodneſs of ſerges is known by the quilting, as that of cloths by the ſpinning. Of ſerges there are various kinds, denominated either from the different qualities thereof, or from the places where they are wrought. The moſt conſiderable is the London ſerge, now highly valued abroad, particularly in France, where a manufacture is carried on with conſiderable ſucceſs, under the title of *ſerge façon de Londres*.

The method of making the London ſerge we ſhall now deſcribe: For wool, the longeſt is choſen for the warp, and the ſhorteſt for the woof. Before either kind is uſed, it is firſt ſcoured, by putting it in a copper of liquor, ſomewhat more than lukewarm, compoſed of three parts of fair water and one of urine. After having ſtayed long enough therein for the liquor to diſſolve, and take off the greaſe, &c. it is ſtirred briſkly about with a wooden peel; taken out of the liquor, drained, and waſhed in a running water, dried in the ſhade, beaten with ſticks on a wooden rack to drive out the coarſer duſt and filth, and then picked clean with the hands. Thus far prepared, it is greaſed with oil of olives, and the longeſt part, deſtined for the warp, is combed with large combs, heated in a little furnace for the purpoſe. To clear off the oil again, the wool is put in a liquor compoſed of hot water, with ſoap melted therein: whence being taken out, wrung, and dried, it is ſpun on the wheel.

As to the ſhorter wool, intended for the woof, it is only carded on the knee with ſmall cards, and then ſpun on the wheel, without being ſcoured of its oil. It muſt be remarked, that the thread for the warp is always to be ſpun much finer, and better twiſted than that of the woof. The wool both for the warp and the

Serge, Sergeant.

the woof being ſpun, and the thread divided into ſkains, that of the woof is put on ſpools (unleſs it have been ſpun upon them) fit for the cavity or eye of the ſhuttle; and that for the warp is wound on a kind of wooden bobbins to fit it for warping. When warped, it is ſtiffened with a kind of ſize, whereof that made of the ſhreds of parchment is held the beſt; and when dry is put on the loom.

When mounted on the loom, the workman raiſing and lowering the threads (which are paſſed through a reed), by means of four treddles placed underneath the loom, which he makes to act tranſverſely, equally, and alternately, one after another, with his feet, in proportion as the threads are raiſed and lowered, throws the ſhuttle acroſs from one ſide to the other; and each time that the ſhuttle is thrown, and the thread of the woof is croſſed between thoſe of the warp, ſtrikes it with the frame to which the reed is faſtened, through thoſe teeth the threads of the warp paſs; and this ſtroke he repeats twice or thrice, or even more, till he judges the croſſing of the ſerge ſufficiently cloſe: thus he proceeds till the warp is all filled with woof.

The ſerge now taken off the loom is carried to the fuller, who ſcours it in the trough of his mill with a kind of fat earth, called *fuller's earth*, firſt purged of all ſtones and filth. After three or four hours ſcouring, the fuller's earth is waſhed out in fair water, brought by little and little into the trough, out of which it is taken when all the earth is cleared; then, with a kind of iron pincers or plyers, they pull off all the knots, ends, ſtraws, &c. ſticking out on the ſurface on either ſide; and then returning it into the fulling trough, where it is worked with water ſomewhat more than lukewarm, with ſoap diſſolved therein for near two hours: it is then waſhed out till ſuch time as the water becomes quite clear, and there be no ſigns of ſoap left; then it is taken out of the trough, the knots, &c. again pulled off, and then put on the tenter to dry, taking care as faſt as it dries to ſtretch it out both in length and breadth till it be brought to its juſt dimenſions. When well dried, it is taken off the tenter, and dyed, ſhorn, and preſſed.

SERGEANT, or SERJEANT *at Law*, or *of the Coif*, is the higheſt degree taken at the common law, as that of Doctor is of the civil law; and as theſe are ſuppoſed to be the moſt learned and experienced in the practice of the courts, there is one court appointed for them to plead in by themſelves, which is the common pleas, where the common law of England is moſt ſtrictly obſerved: but they are not reſtricted from pleading in any other court, where the judges, who cannot have that honour till they have taken the degree of ſerjeant at law, call them *brothers*.

SERGEANT at Arms, or *Mace*, an officer appointed to attend the perſon of the king; to arreſt traitors, and ſuch perſons of quality as offend; and to attend the lord high ſteward, when ſitting in judgement on a traitor.

Of theſe, by ſtatute 13 Richard II. cap. 6. there are not to be above 30 in the realm. There are now nine at court at 100l. per annum ſalary each; they are called the *king's ſergeants at arms*, to diſtinguiſh them from others: they are created with great ceremony, the perſon kneeling before the king, his majeſty lays the mace on his right ſhoulder, and ſays, *Riſe up, ſergeant at arms, and eſquire for ever*. They have, beſides, a patent for the office, which they hold for life.

Sergeant ‖ Series.

They have their attendance in the preſence-chamber, where the band of gentlemen-penſioners wait; and, receiving the king at the door, they carry the maces before him to the chapel door, whilſt the band of penſioners ſtand foremoſt, and make a lane for the king, as they alſo do when the king goes to the houſe of lords.

There are four other ſergeants at arms, created in the ſame manner; one, who attends the lord chancellor; a ſecond, the lord treaſurer; a third, the ſpeaker of the houſe of commons; and a fourth, the lord mayor of London on ſolemn occaſions.

They have a conſiderable ſhare of the fees of honour, and travelling charges allowed them when in waiting, viz. five ſhillings per day when the court is within ten miles of London, and ten ſhillings when twenty miles from London. The places are in the lord chamberlain's gift.

There are alſo ſergeants of the mace of an inferior kind, who attend the mayor or other head officer of a corporation.

Common SERGEANT, an officer in the city of London, who attends the lord mayor and court of aldermen on court days, and is in council with them on all occaſions, within and without the precincts or liberties of the city. He is to take care of orphans eſtates, either by taking account of them, or to ſign their indentures, before their paſſing the lord mayor and court of aldermen: and he was likewiſe to let and manage the orphan eſtates, according to his judgement to their beſt advantage. See RECORDER.

SERGEANT, in *War*, is an uncommiſſioned officer in a company of foot or troop of dragoons, armed with an halbert, and appointed to ſee diſcipline obſerved, to teach the ſoldiers the exerciſe of their arms, to order, ſtraiten, and form their ranks, files, &c. He receives the orders from the adjutant, which he communicates to his officers. Each company generally has two ſergeants.

SERGEANTY (*Serjeantia*), ſignifies, in law, a ſervice that cannot be due by a tenant to any lord but the king; and this is either *grand ſergeanty*, or *petit*. The firſt is a tenure by which the one holds his lands of the king by ſuch ſervices as he ought to do in perſon to the king at his coronation; and may alſo concern matters military, or ſervices of honour in peace; as to be the king's butler, carver, &c. *Petit ſergeanty* is where a man holds lands of the king to furniſh him yearly with ſome ſmall thing towards his wars; and in effect payable as rent. Though all tenures are turned into *ſoccage* by the 12 Car. II. cap. 24. yet the honorary ſervices of grand ſergeanty ſtill remain, being therein excepted. See *KNIGHT-Service*.

SERIES, in general, denotes a continual ſucceſſion of things in the ſame order, and having the ſame relation or connection with each other: in this ſenſe we ſay, a ſeries of emperors, kings, biſhops, &c.

In natural hiſtory, a ſeries is uſed for an order or ſubdiviſion of ſome claſs of natural bodies; comprehending all ſuch as are diſtinguiſhed from the other bodies of that claſs, by certain characters which they poſſeſs in common, and which the reſt of the bodies of that caſt have not.

Series. (1.) SERIES, in *Arithmetic* or *Algebra*, a rank or progreſſion of quantities which ſucceed one another according to ſome determinate law. For example, the numbers

$$3, 5, 7, 9, 11, 13, 15, \&c.$$

conſtitute a ſeries, the law of which is that each term exceeds that before it by a given number, viz. 2. Again, the numbers

$$3, 6, 12, 24, 48, 96, 192, \&c.$$

conſtitute a ſeries of a different kind, each term being the product of the term before it, and the given number 2.

(2.) As the law according to which the terms of a ſeries are formed may be infinitely varied, there may be innumerable kinds of ſeries; we ſhall enumerate a few of the moſt common.

1. *Arithmetical Series.* The general form of a ſeries of this kind is

$$a, a+d, a+2d, a+3d, a+4d, \&c.$$

and its law is that the difference between any two adjacent terms is the ſame quantity, viz. d. The firſt of the two preceding examples is a ſeries of this nature.

2. *Geometrical Series.* Its general form is

$$a, ar, ar^2, ar^3, ar^4, \&c.$$

In this kind of ſeries each term is the product of that which precedes it and a conſtant number r, which is called the common ratio of the terms. The ſecond of the above examples is a particular caſe of a geometrical ſeries.

3. *Harmonic Series* is that in which the firſt of any three of its conſecutive terms is to the third, as the difference between the firſt and ſecond to the difference between the ſecond and third: hence we readily find that putting a and b for its two firſt terms, its general form will be

$$a, b, \frac{ab}{2a-b}, \frac{ab}{3a-2b}, \frac{ab}{4a-3b}, \&c.$$

If we ſuppoſe $a=1$ and $b=\frac{1}{2}$, we get

$$1, \tfrac{1}{2}, \tfrac{1}{3}, \tfrac{1}{4}, \tfrac{1}{5}, \tfrac{1}{6}, \&c.$$

as a particular example of a harmonic ſeries.

4. *Recurring Series.* Let its terms be denoted by

$$A, B, C, D, E, F, \&c.$$

Then, we ſhall form a recurring ſeries, if m and n being put for given quantities, we take

$$C=mA+nB, \qquad E=mC+nD,$$
$$D=mB+nC, \qquad F=mD+nE.$$

For example, let us ſuppoſe $A=1$, $B=2x$, $m=4x^2$, $n=3x$; then $C=10x^2$, $D=38x^3$, $E=154x^4$, $F=614x^5$, ſo that the firſt ſix terms of the ſeries are

$$1, 2x, 10x^2, 38x^3, 154x^4, 614x^5.$$

We have here ſuppoſed each term to be formed from the two which come immediately before it; but the name *recurring ſeries* is given to every one in which the terms are formed in like manner from ſome aſſigned number of the terms which precede that ſought. Thus, putting as before A, B, C, D, &c. for the terms of the ſeries, and m, n, p, q for given quantities, we ſhall have another recurring ſeries, if we ſuppoſe them ſo related that Series.

$$mA+nB+pC+qD=0,$$
$$mB+nC+pD+qE=0,$$
$$mC+nD+pE+qF=0,$$

The two ſeries of quantities ſin. a, ſin. $2a$, ſin. $3a$, &c. and cof. a, cof. $2a$, cof. $3a$, &c. are both recurring, as is manifeſt from the law which connects the quantities one with another. (See ALGEBRA, §. 358.).

(3.) As in general it is the ſum of the terms of a ſeries which is the object of inveſtigation, it is uſual to connect them by the ſign + or —, and to apply the name *ſeries* to the expreſſion thus formed. Accordingly

$$1+3+5+7+9\cdots+\left\{1+2(n-1)\right\}$$

(where n denotes the number of terms) is called an arithmetical ſeries; and in like manner

$$1+\tfrac{1}{2}+\tfrac{1}{4}+\tfrac{1}{8}\cdots+\frac{1}{2^{n-1}}$$

is a geometrical ſeries.

(4.) A ſeries may either conſiſt of a definite number of terms, or their number may be ſuppoſed greater than any that can be aſſigned, and in this caſe the ſeries is ſaid to be *infinite*. The number of terms of a ſeries may be infinite, and yet their ſum finite. This is true: for example, of the ſeries

$$\tfrac{1}{2}+\tfrac{1}{4}+\tfrac{1}{8}+\tfrac{1}{16}+\&c.$$

which is equivalent to unity, or 1.

(5.) We have already treated of ſeveral branches of the doctrine of ſeries in the articles ALGEBRA, FLUXIONS and LOGARITHMS; and in particular we have given four different methods for expanding a quantity into a ſeries, viz.

1. By *Diviſion* or *Evolution*. (See ALGEBRA, § 78, and § 260.).

2. By *the Method of Indeterminate Coefficients*. (ALGEBRA, § 261.).

3. By *the Binomial Theorem*. (ALGEBRA, § 263—§ 269.).

4. By *Taylor's Theorem*. (FLUXIONS, § 66—§ 72.).

We ſhall here treat briefly of another branch of the theory, namely, how to find the ſum of any propoſed number of terms of certain ſeries, or the ſum of their terms continued *ad infinitum*, when that ſum is finite.

(6.) There is a great analogy between the terms of a ſeries and the ordinates of a curve which are ſuppoſed to ſtand upon the axis at equal diſtances from one another, the firſt ordinate reckoned from the extremity of the axes being analogous to the firſt term of the ſeries, the ſecond ordinate to the ſecond term, and ſo on. From this analogy it follows immediately, that like as the nature of a curve is indicated by an equation expreſſing the value of an indefinite ordinate in terms of its correſponding abſciſſa, ſo alſo the nature of a ſeries may be ſhown by an equation which ſhall expreſs the relation between any term; and the number that denotes the place or order of that term in the ſeries. In conformity

Series. conformity to this method, putting the ſymbols $T_{(1)}$, $T_{(2)}$, $T_{(3)}$, &c. to denote the terms of any ſeries whatever, we may expreſs it generally thus.

$$T_{(1)} + T_{(2)} + T_{(3)} \cdots + T_{(v)}$$

where the characters (1), (2), are meant to denote the place or order of the terms to which they are joined, (the firſt term being ſuppoſed to have the place 1, the ſecond term the place 2, and ſo on) and (v) is put for any indefinite number.

The nature of the arithmetical ſeries

$$a+(a+d)+(a+2d)+(a+3d)+, \text{ \&c.}$$

will be defined by the equation

$$T_{(v)} = a+(v-1)d,$$

and, in like manner, the nature of the geometrical ſeries

$$a+ar+ar^2+ar^3+, \text{ \&c.}$$

will be expreſſed by the equation

$$T_{(v)} = ar^{v-1}.$$

(7.) As the expreſſion for the value of the indefinite term $T_{(v)}$ becomes identical with all the terms of the ſeries in ſucceſſion, by ſubſtituting the numbers 1, 2, 3, &c. one after another for v, that expreſſion is called the *general term* of the ſeries. In the ſeries

$$a+b+\frac{ab}{2a-b}+\frac{ab}{3a-2b}+\frac{ab}{4a-3b}+, \text{ \&c.}$$

the general term is evidently $\frac{ab}{(v-1)a-(v-2)b}$.

(8.) We ſhall now inveſtigate the ſum of any number of terms of ſuch ſeries as have their general terms expreſſed by any one of the following algebraic functions

$$v, \quad \frac{v(v+1)}{1\cdot 2}, \quad \frac{v(v+1)(v+2)}{1\cdot 2\cdot 3}, \quad \frac{v(v+1)(v+2)(v+3)}{1\cdot 2\cdot 3}, \text{ \&c.}$$

Problem I. It is propoſed to find the ſum of n terms of the ſeries of which the general term is the firſt function.

By putting 1, 2, 3, &c. to n ſucceſſively for v, it appears that the ſeries to be ſummed is

$$1+2+3+4\cdots+n.$$

Now, as $v=\frac{v(v+1)}{2}-\frac{(v-1)v}{2}$, we have, by putting in this formula 1, 2, 3, $\cdots$ to n ſucceſſively for v,

$$1=\frac{1\cdot 2}{2}-0,$$
$$2=\frac{2\cdot 3}{2}-\frac{1\cdot 2}{2},$$
$$3=\frac{3\cdot 4}{2}-\frac{2\cdot 3}{2},$$
$$4=\frac{4\cdot 5}{2}-\frac{3\cdot 4}{2},$$
$$\cdots\cdots$$
$$n-1=\frac{(n-1)n}{2}-\frac{(n-2)(n-1)}{2},$$
$$n=\frac{n(n+1)}{2}-\frac{(n-1)n}{2}.$$

Series.

Let the ſum of the quantities on each ſide of the ſign = be now taken; then, obſerving that each of the fractions on the right hand ſide, with the exception of $\frac{n(n+1)}{1\cdot 2}$, occurs twice, once with the ſign +, and again with the ſign —, by which it happens that their aggregate is =0, it is evident that we have

$$1+2+3+4\cdots+n=\frac{n(n+1)}{1\cdot 2}.$$

Prob. II. It is propoſed to ſum n terms of the ſeries having for its general term the ſecond function

$$\frac{v(v+1)}{1\cdot 2}.$$

This ſeries, by ſubſtituting 1, 2, 3, &c. ſucceſſively for v, is found to be

$$\frac{1\cdot 2}{1\cdot 2}+\frac{2\cdot 3}{1\cdot 2}+\frac{3\cdot 4}{1\cdot 2}\cdots+\frac{n(n+1)}{1\cdot 2}.$$

We now, following the mode of proceeding employed in laſt problem, put the expreſſion $\frac{v(v+1)}{1\cdot 2}$ under this form,

$$\frac{v(v+1)(v+2)}{1\cdot 2\cdot 3}-\frac{(v-1)v(v+1)}{1\cdot 2\cdot 3},$$

to which it is evidently equivalent, and, ſubſtituting 1, 2, 3, &c. ſucceſſively for v, find

$$\frac{1\cdot 2}{1\cdot 2}=\frac{1\cdot 2\cdot 3}{1\cdot 2\cdot 3}-0,$$
$$\frac{2\cdot 3}{1\cdot 2}=\frac{2\cdot 3\cdot 4}{1\cdot 2\cdot 3}-\frac{1\cdot 2\cdot 3}{1\cdot 2\cdot 3},$$
$$\frac{3\cdot 4}{1\cdot 2}=\frac{3\cdot 4\cdot 5}{1\cdot 2\cdot 3}-\frac{2\cdot 3\cdot 4}{1\cdot 2\cdot 3},$$
$$\frac{4\cdot 5}{1\cdot 2}=\frac{4\cdot 5\cdot 6}{1\cdot 2\cdot 3}-\frac{3\cdot 4\cdot 5}{1\cdot 2\cdot 3},$$
$$\cdots\cdots$$
$$\frac{n(n+1)}{1\cdot 2}=\frac{n(n+1)(n+2)}{1\cdot 2\cdot 3}-\frac{(n-1)n(n+1)}{1\cdot 2\cdot 3}.$$

In this problem, as in the former, it appears that each quantity on the right ſide of the equations, except $\frac{n(n+1)(n+2)}{1\cdot 2\cdot 3}$, occurs twice, and with contrary ſigns; therefore, taking the aggregate of the terms on each ſide, we have

$$\frac{1\cdot 2}{1\cdot 2}+\frac{2\cdot 3}{1\cdot 2}+\frac{3\cdot 4}{1\cdot 2}+\frac{4\cdot 5}{1\cdot 2}\cdots+\frac{n(n+1)}{1\cdot 2}=\frac{n(n+1)(n+2)}{1\cdot 2\cdot 3}.$$

(9.) It will be obvious, by a little attention to the ſolutions of theſe two problems, that in each the terms of the ſeries to be ſummed are the differences betwixt the adjacent

Series. adjacent terms of another ſeries, namely, that which has for its general term the function next in order to the general term of the ſeries under conſideration; that is, the terms of the ſeries whoſe general term is v, are the differences betwixt thoſe of the ſeries having $\frac{v(v+1)}{1\cdot 2}$ for its general terms; and, again, the terms of this laſt are the differences of the terms of the ſeries having $\frac{v(v+1)(v+2)}{1\cdot 2\cdot 3}$ for its general term. Now as the ſum of the differences of any ſeries of quantities whatever which begins with o muſt neceſſarily be the laſt term of that ſeries *, it follows, that the ſum of all the terms of each of the ſeries we have conſidered muſt be equal to the laſt term of the next following ſeries; and this term is neceſſarily the expreſſion formed by ſubſtituting n for v in its general term, that is, the ſum of the ſeries $1+2+3\cdots+n$, which has v for its general term, is $\frac{n(n+1)}{1\cdot 2}$; and the ſum of the ſeries

$$\frac{1\cdot 2}{1\cdot 2}+\frac{2\cdot 3}{1\cdot 2}+\frac{3\cdot 4}{1\cdot 2}\cdots++\frac{n(n+1)}{1\cdot 2}$$
$$\text{is } \frac{n(n+1)(n+2)}{1\cdot 2\cdot 3}.$$

The next ſeries which has $\frac{v(v+1)(v+2)}{1\cdot 2\cdot 3}$ for its general term, as well as all that ſucceed, will be found to have the very ſame property, as may be proved as follows. Let p denote any term of the ſeries of natural numbers 1, 2, 3, &c. Then, becauſe

$$1=\frac{v+p}{p+1}-\frac{v-1}{p+1},$$

if we multiply theſe equals by the product of all the factors v, $\frac{v+1}{2}$, $\frac{v+2}{3}$, &c. to $\frac{v+p-1}{p}$, we get

$$\frac{v(v+1)(v+2)\cdots(v+p-1)}{1\cdot 2\cdot 3\cdots p}$$
$$=\begin{cases}\frac{v(v+1)(v+2)\cdots(v+p)}{1\cdot 2\cdot 3\cdots(p+1)}\\ -\frac{(v-1)v(v+1)\cdots(v+p-1)}{1\cdot 2\cdot 3\cdots(p+1)}.\end{cases}$$

Now, if in this identical equation we ſubſtitute the numbers 1, 2, 3, &c. to n ſucceſſively for v, the reſults obtained from its firſt member

$$\frac{v(v+1)(v+2)\cdots(v+p-1)}{1\cdot 2\cdot 3\cdots p}$$

will be a ſeries having this function for its general term, and the terms of which will evidently be the difference between the terms of another ſeries having the firſt part of the ſecond member of the equation, viz.

$$\frac{v(v+1)(v+2)\cdots(v+p)}{1\cdot 2\cdot 3\cdots(p+1)},$$

for its general term: Hence it will happen, as in the two foregoing problems, that the ſum of all the terms of the former ſeries will be equal to the laſt term of the latter; which concluſion may be expreſſed in the form of a theorem, as follows: Series.

THEOREM. *The ſum of* n *terms of a ſeries having for its general term the function,*

$$\frac{v(v+1)(v+2)\cdots(v+p-1)}{1\cdot 2\cdot 3\cdots p}$$

is equal to

$$\frac{n(n+1)(n+2)\cdots(n+p)}{1\cdot 2\cdot 3\cdots(p+1)}.$$

Or, ſetting aſide the denominators of the terms, we may expreſs the theorem thus: *The ſum of* n *terms of a ſeries, having for its general term the expreſſion*

$$v(v+1)(v+2)\cdots(v+p-1),$$

is equal to

$$\frac{n(n+1)(n+2)\cdots(n+p)}{p+1}.$$

We ſhall here give a few particular caſes of this laſt general formula.

I. $$1+2+3+4\cdots+n=\frac{n(n+1)}{2}.$$

II. $$1\cdot 2+2\cdot 3+3\cdot 4+4\cdot 5\cdots+n(n+1)=\frac{n(n+1)(n+2)}{3}.$$

III. $$1\cdot 2\cdot 3+2\cdot 3\cdot 4+3\cdot 4\cdot 5\cdots+n(n+1)(n+2)=\frac{n(n+1)(n+2)(n+3)}{4}.$$

(10.) By means of the above general theorem we may find the ſum of any number of terms of a ſeries compoſed of the powers of the terms of an arithmetical progreſſion, the general term of which will, in the ſimpleſt caſe, be v^p, p being a given number. The manner of doing this will appear from the following problems.

PROB. III. It is propoſed to find the ſum of n terms of the ſeries of ſquares $1+4+9+16+25+$ &c. or $1^2+2^2+3^2+4^2+5^2+$ &c.

The general term of this ſeries being v^2, we put it under this form, $v(v+1)-v$; hence we get by ſubſtituting 1, 2, 3, &c. for v,

$$1^2=1\cdot 2-1,$$
$$2^2=2\cdot 3-2,$$
$$3^2=3\cdot 4-3,$$
$$4^2=4\cdot 5-4,$$
$$\cdots\cdots$$
$$n^2=n(n+1)-n.$$

Therefore adding, we find

$$1^2+2^2+3^2+4^2\cdots+n^2$$
$$=\begin{cases}1\cdot 2+2\cdot 3+3\cdot 4+4\cdot 5\cdots+n(n+1)\\ -(1+2+3+4\cdots+n).\end{cases}$$

But

* For example, let the quantities be o, a, b, c, d; then it is manifeſt that $(a-o)+(b-a)+(c-b)+(d-c)=d$.

Series. But by the general theorem (9.)

$$1\cdot 2+2\cdot 3+3\cdot 4\cdots+n(n+1)=\frac{n(n+1)(n+2)}{3},$$

and, $$1+2+3+4\cdots+n=\frac{n(n+1)}{2};$$

therefore
$$1^2+2^2+3^2+4^2\cdots+n^2$$
$$=\frac{n(n+1)(n+2)}{3}-\frac{n(n+1)}{2}$$
$$=\frac{n(n+1)(2n+1)}{6}.$$

We might have arrived at the ſame concluſion by conſidering that ſince v^2, the general term of the ſeries, is equivalent to $v(v+1)-v$, the ſeries muſt be the difference between two others, one having $v(v+1)$ and the other v for its general term; for the ſake of perſpicuity, however, we have put down the terms of all the three ſeries.

PROB. IV. It is propoſed to find the ſum of n terms of the ſeries

$$1^3+2^3+3^3+4^3+5^3+\text{ \&c.}$$

The general term in this caſe is v^3; now to transform this function, ſo as to deduce the ſum of the ſeries from the general theorem, we aſſume

$$v^3=v(v+1)(v+2)+Av(v+1)+Bv,$$

where A and B denote quantities which are to have ſuch values as ſhall render the two ſides of the equation identical whatever be the value of v; taking now the product of the factors, we have

$$v^3=v^3+(A+3)v^2+(A+B+2)v,$$

Therefore, by the theory of indeterminate coefficients, (ALGEBRA, § 261.)

$$A+3=0,\ A+B+2=0:$$

Hence we find $A=-3$, $B=-A-2=1$; thus it appears that v being any number whatever,

$$v^3=v(v+1)(v+2)-3v(v+1)+v.$$

Now, let S denote the ſum of n terms of the ſeries under conſideration, which has v^3 for its general term, and put P, Q, R for the like ſums of the three ſeries, whoſe general terms are the functions $v(v+1)(v+2)$, $v(v+1)$ and v reſpectively; then, it is evident that $S=P-3Q+R$. But by the theorem, (9.)

$$P=\frac{n(n+1)(n+2)(n+3)}{4},$$
$$Q=\frac{n(n+1)(n+2)}{3},$$
$$R=\frac{n(n+1)}{2},$$

therefore,
$$S=\frac{n(n+1)(n+2)(n+3)}{4}$$
$$-n(n+1)(n+2)+\frac{n(n+1)}{2},$$

and by proper reduction, S, or

$$1^3+2^3+3^3+4^3\cdots+n^3=\frac{n^2(n+1)^2}{4}.$$

Corollary. We have found (PROB. I.) that Series.

$$1+2+3+4\cdots+n=\frac{n(n+1)}{2},$$

therefore, comparing this with the reſult juſt now obtained, it is evident that

$$(1+2+3+4\cdots+n)^2=1^3+2^3+3^3+4^3\cdots+n^3;$$

this is a very curious and elegant property of numbers.

(11.) It is manifeſt that by the mode of proceeding employed in laſt problem we may inveſtigate the ſum of n terms of the ſeries

$$1^m+2^m+3^m+4^m+\text{ \&c.}$$

m being any whole poſitive number whatever: and indeed in the very ſame way we may find the ſum of any number of terms of a ſeries, whoſe general term is

$$a+bv+cv^2+dv^3+\text{ \&c.}$$

where a and b, &c. denote given numbers; namely, by transforming it into a function of the form

$$A+Bv+Cv(v+1)+Dv(v+1)(v+2)+\text{ \&c.}$$

where A, B, and C, &c. denote conſtant quantities. Our limits, however, will not allow us to go into particulars.

(12.) The next claſs of ſeries we ſhall conſider, comprehends ſuch as may be formed by the ſucceſſive ſubſtitution of a, $a+1$, $a+2$, &c. (a being put for any given quantity whatever) in the ſeries of functions

$$\frac{1}{v(v+1)},\ \frac{1}{v(v+1)(v+2)},\ \frac{1}{v(v+1)(v+2)(v+3)},\ \text{\&c.}$$

We ſhall begin with the firſt of theſe.

PROB. V. It is propoſed to find the ſum of n terms of the ſeries

$$\frac{1}{a(a+1)}+\frac{1}{(a+1)(a+2)}+\frac{1}{(a+2)(a+3)}+\text{ \&c.}$$

which is formed by ſubſtituting a, $a+1$, $a+2$, &c. ſucceſſively for v in the general term $\frac{1}{v(v+1)}$.

Whatever be the value of v, we have

$$\frac{1}{v(v+1)}=\frac{1}{v}-\frac{1}{v+1},$$

therefore, proceeding as in the foregoing problems, we get

$$\frac{1}{a(a+1)}=\frac{1}{a}-\frac{1}{a+1},$$
$$\frac{1}{(a+1)(a+2)}=\frac{1}{a+1}-\frac{1}{a+2},$$
$$\frac{1}{(a+2)(a+3)}=\frac{1}{a+2}-\frac{1}{a+3},$$
$$\cdots\cdots$$
$$\frac{1}{(a+n-2)(a+n-1)}=\frac{1}{a+n-2}-\frac{1}{a+n-1},$$
$$\frac{1}{(a+n-1)(a+n)}=\frac{1}{a+n-1}-\frac{1}{a+n}.$$

Here it is evident that the terms of the ſeries to be ſummed

Series. ſummed are the differences betwixt every two adjoining terms of this other ſeries.

$$\frac{1}{a}+\frac{1}{a+1}+\frac{1}{a+2}+\frac{1}{a+3}\cdots+\frac{1}{a+n};$$

Hence it immediately follows, that the ſum of all the terms of the former is the difference between the two extreme terms of the latter; that is

$$\frac{1}{a(a+1)}+\frac{1}{(a+1)(a+2)}\cdots+\frac{1}{(a+n-1)(a+n)}=\frac{1}{a}-\frac{1}{a+n}.$$

If we ſuppoſe the ſeries to be continued *ad infinitum*, then, as n will be indefinitely great, and $\frac{1}{a+n}$ indefinitely ſmall, the ſum will be ſimply $\frac{1}{a}$; or in other words, the fraction $\frac{1}{a}$ is a limit to the ſum of the ſeries.

Prob. VI. Let it be required to find the ſum of n terms of this ſeries.

$$\frac{1}{a(a+1)(a+2)}+\frac{1}{(a+1)(a+2)(a+3)}+\frac{1}{(a+2)(a+3)(a+4)}+, \&c.$$

the general term in this caſe being $\frac{1}{v(v+1)(v+2)}$.

Becauſe $\frac{2}{v(v+2)}=\frac{1}{v}-\frac{1}{v+2}$, therefore, multiplying by $\frac{1}{2(v+1)}$, we have

$$\frac{1}{v(v+1)(v+2)}=\tfrac{1}{2}\left\{\frac{1}{v(v+1)}-\frac{1}{(v+1)(v+2)}\right\},$$

and hence, by ſubſtituting a, $a+1$, $a+2$, &c. ſucceſſively for v,

$$\frac{1}{a(a+1)(a+2)}=\tfrac{1}{2}\left\{\frac{1}{a(a+1)}-\frac{1}{(a+1)(a+2)}\right\}.$$

$$\frac{1}{(a+1)(a+2)(a+3)}=\tfrac{1}{2}\left\{\frac{1}{(a+1)(a+2)}-\frac{1}{(a+2)(a+3)}\right\}.$$

$$\frac{1}{(a+2)(a+3)(a+4)}=\tfrac{1}{2}\left\{\frac{1}{(a+2)(a+3)}-\frac{1}{(a+3)(a+4)}\right\}$$

.

$$\frac{1}{(a+n-1)(a+n)(a+n+1)}=\tfrac{1}{2}\left\{\frac{1}{(a+n-1)(a+n)}-\frac{1}{(a+n)(a+n+1)}\right\}.$$

Hence it appears that the terms of the ſeries to be ſummed are the halves of the differences of the terms of the ſeries

$$\frac{1}{a(a+1)}+\frac{1}{(a+1)(a+2)}+\frac{1}{(a+2)(a+3)}\cdots+\frac{1}{(a+n)(a+n+1)};$$

Series. conſequently, the ſum of all the terms of the former is half the difference between the extreme terms of the latter, or is =

$$\tfrac{1}{2}\left\{\frac{1}{a(a+1)}-\frac{1}{(a+n)(a+n+1)}\right\}.$$

(13.) From theſe two particular caſes it is eaſy to ſee how we may ſum the ſeries when the general term is

$$\frac{1}{v(v+1)(v+2)\cdots(v+p)},$$

p being any whole number whatever: for ſince

$$\frac{p}{v(v+p)}=\frac{1}{v}-\frac{1}{v+p},$$

therefore, multiplying the denominaters by all the factors which are intermediate between v and $v+p$,

we have

$$\frac{p}{v(v+1)(v+2)\cdots(v+p)}=\frac{1}{v(v+1)(v+2)\cdots(v+p-1)}-\frac{1}{(v+1)(v+2)(v+3)\cdots(v+p)}.$$

Now the latter ſide of this equation is a general expreſſion for the difference between any two adjacent terms of a ſeries whoſe general term is

$$\frac{1}{v(v+1)(v+2)\cdots(v+p-1)},$$

therefore the difference between the firſt and laſt terms of this ſeries muſt be the ſum of the ſeries whoſe general term is the function on the other ſide of the equation, viz.

$$\frac{p}{v(v+1)(v+2)\cdots(v+p)}.$$

Hence we have the following very general theorem.

Theorem. *Let* a *denote any number whatever, and let* 1, 2, 3 . . . p *be a ſeries of numbers, each of which exceeds that before it by unity; the ſum of* n *terms of a ſeries formed by ſubſtituting the numbers* a, a+1, a+2, &c. to a+n−1 *ſucceſſively for* v *in the function*

$$\frac{1}{v(v+1)(v+2)\cdots(v+p)}$$

is equal to

$$\frac{1}{p}\left\{\frac{1}{a(a+1)(a+2)\cdots(a+p-1)}-\frac{1}{(a+n)(a+n+1)(a+n+2)\cdots(a+n+p-1)}\right.$$

Corollary,

Series. COROLLARY. *The ſame ſeries continued ad infinitum is equal to*

$$\frac{1}{p}\,\frac{1}{a(a+1)(a+2)\cdots(a+p-1)}.$$

(14.) We ſhall now give a few examples of the application of this theorem.

Example 1. Required the ſum of n terms of the ſeries

$$\frac{1}{2\cdot3\cdot4\cdot5}+\frac{1}{3\cdot4\cdot5\cdot6}+\frac{1}{4\cdot5\cdot6\cdot7}+,\&c.$$

The terms of this ſeries are evidently produced by the ſucceſſive ſubſtitution of the numbers 2, 3, 4, 5, &c. for v in the function

$$\frac{1}{v(v+1)(v+2)(v+3)};$$

therefore, comparing this expreſſion with the general formula, we have $a=2, p=3$, and the ſum required

$$=\tfrac{1}{3}\left\{\frac{1}{2\cdot3\cdot4}-\frac{1}{(2+n)(3+n)(4+n)}\right\}.$$

Ex. 2. Required the ſum of the ſeries

$$\frac{1}{1\cdot4\cdot7}+\frac{1}{4\cdot7\cdot10}+\frac{1}{7\cdot10\cdot13}+\frac{1}{10\cdot13\cdot16}+,\&c.$$

continued *ad infinitum.*

By a little attention it will appear that its terms are produced by the ſubſtitution of the numbers $\frac{1}{3}$, $1\frac{1}{3}$, $2\frac{1}{3}$, &c. ſucceſſively for v in the function

$$\frac{1}{3v(3v+3)(3v+6)}=\frac{1}{27v(v+1)(v+2)};$$

In this caſe then $a=\frac{1}{3}, p=2$, therefore the ſum is

$$\frac{1}{2}\times\frac{1}{27}\,\frac{1}{\frac{1}{3}\times1\frac{1}{3}}=\frac{1}{24}.$$

(15.) When the function from which the ſeries is derived has not the very form required in the theorem, it may be brought to that form by employing ſuitable tranſformations, as in the two following examples.

Ex. 3. It is propoſed to find the ſum of the ſeries

$$\frac{1}{1.4}+\frac{1}{2.5}+\frac{1}{3.6}+\frac{1}{4.7}+,\&c.$$

continued *ad infinitum.*

This ſeries is evidently formed by the ſubſtitution of the numbers 1, 2, 3, &c. ſucceſſively for v in the function $\frac{1}{v(v+3)}$. This expreſſion, however, does not in its preſent form agree with the general formula, becauſe the factors $v+1$, $v+2$ are wanting; therefore to tranſform it, we multiply its numerator and denominator by $(v+1)(v+2)$, and it becomes

$$\frac{(v+1)(v+2)}{v(v+1)(v+2)(v+3)};$$

we next aſſume its numerator

$$(v+1)(v+2)=A(v+2)(v+3)+B(v+3)+C,$$ Series.

and by multiplying get

$$v^2+3v+2=Av^2+(5A+B)v+(6A+3B+C);$$

therefore, that v may be indeterminate, we muſt make

$$A=1,\ 5A+B=3,\ 6A+3B+C=2,$$

from which equations we get $A=1$, $B=3-5A=-2$, $C=2-6A-3B=2$, ſo that

$$\frac{1}{v(v+3)}=\frac{(v+2)(v+3)-2(v+3)+2}{v(v+1)(v+2)(v+3)}$$
$$=\frac{1}{v(v+1)}-\frac{2}{v(v+1)(v+2)}$$
$$+\frac{2}{v(v+1)(v+2)(v+3)}.$$

Thus it appears that the propoſed ſeries is reſolvable into three others, the general terms of which all agree with the theorem. Now the ſum of the infinite ſeries whoſe general term is $\frac{1}{v(v+1)}$ appears by the theorem to be $\frac{1}{a}$, or 1, becauſe $a=1$, and the ſum of the infinite ſeries whoſe general term is $\frac{-2}{v(v+1)(v+2)}$, is in like manner found to be $\frac{-2}{2}+\frac{1}{1\cdot2}=\frac{-1}{2}$; and laſtly, the infinite ſeries whoſe general term is $\frac{2}{v(v+1)(v+2)(v+3)}$ is $\frac{2}{3}\,\frac{1}{1\cdot2\cdot3}=\frac{1}{9}$; therefore, collecting theſe into one, the ſum of the propoſed ſeries is $1-\frac{1}{2}+\frac{1}{9}=\frac{11}{18}$, the anſwer.

Ex. 4. Required the ſum of the infinite ſeries.

$$\frac{1}{2\cdot3\cdot4}+\frac{2}{3\cdot4\cdot5}+\frac{3}{4\cdot5\cdot6}+\frac{4}{5\cdot6\cdot7}+,\&c.$$

The terms of this ſeries are evidently formed by the ſubſtitution of the numbers 2, 3, 4, ſucceſſively in the function

$$\frac{v-1}{v(v+1)(v+2)}.$$

Now $v-1=v+2-3$; therefore,

$$\frac{v-1}{v(v+1)(v+2)}=\frac{1}{v(v+1)}-\frac{3}{v(v+1)(v+2)};$$

thus it appears that the propoſed ſeries is reducible to two others, one having its terms produced by the ſubſtitution of 2, 3, &c. for v in the function $\frac{1}{v(v+1)}$, and the other by a like ſubſtitution in the function $\frac{-3}{v(v+1)(v+2)}$. Now, by our theorem, the ſum of the firſt of theſe is $\frac{1}{2}$, and that of the ſecond is $\frac{-3}{2}\,\frac{1}{2\cdot3}$

Series. $\frac{1}{2\cdot 3}=-\frac{1}{4}$, therefore the ſum of the propoſed ſeries is

$\frac{1}{2}-\frac{1}{4}=\frac{1}{4}$.

From theſe examples it is ſufficiently evident how the theorem is to be applied in other caſes; and it appears alſo that by means of it we can ſum any ſeries whatever whoſe general term is of the form

$$\frac{A}{v(1+v)}+\frac{B}{v(1+v)(v+1)}+\frac{C}{v(v+1)(v+2)(v+3)}+, \text{ &c.}$$

or admits of being reduced to that form.

(16.) It deſerves to be remarked that the ſeries

$$\frac{1}{1}+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+, \text{ &c.}$$

which is of a very ſimple form, and in appearance of the ſame nature as thoſe we have ſummed, does not however admit of being treated in the ſame manner; and indeed, if it be continued *ad infinitum*, its ſum is infinite, that is, it exceeds any number which can be aſſigned. The truth of this aſſertion will be evident if we can ſhew that a certain definite number of its terms, beginning with any propoſed term, can always be found, the ſum of which ſhall exceed an unit or 1; for this being the caſe, as we can go on continually in aſſigning ſuch ſets of terms, we can conceive as many to be taken as there are units in any propoſed number however great; and therefore their ſum, and much more the ſum of all the terms of the ſeries from its beginning to the end of the laſt ſets of terms will exceed that number. Now that this can always be done may be proved as follows:

Let the term of the ſeries from which we are to reckon be $\frac{1}{a}$, then, if the thing be poſſible, and if n be the requiſite number of terms, we muſt have

$$\frac{1}{a}+\frac{1}{a+1}+\frac{1}{a+2}+\frac{1}{a+3}\cdots+\frac{1}{a+n-1}>1.$$

Now becauſe

$$a\left(1+\frac{1}{a}\right)^2=a+2+\frac{1}{a},$$

$$a\left(1+\frac{1}{a}\right)^3=a+3+\frac{3}{a}+\frac{1}{a^2},$$

and in general,

$$a\left(1+\frac{1}{a}\right)^p=a+p+\frac{p\cdot p-1}{1\cdot 2}\frac{1}{a}+, \text{ &c.}$$

therefore, p being any whole number,

$$a\left(1+\frac{1}{a}\right)^p>a+p, \text{ and conſequently}$$

$$\frac{1}{a+p}>\frac{1}{a\left(1+\frac{1}{a}\right)^p};$$

hence it follows that the ſeries

$$\frac{1}{a}+\frac{1}{a+1}+\frac{1}{a+2}\cdots+\frac{1}{a+n-1}$$ Series.

will be greater than the other ſeries

$$\frac{1}{a}+\frac{1}{a\left(1+\frac{1}{a}\right)}+\frac{1}{a\left(1+\frac{1}{a}\right)^2}+\frac{1}{a\left(1+\frac{1}{a}\right)^3}\cdots$$
$$+\frac{1}{a\left(1+\frac{1}{a}\right)^{n-1}}.$$

Now this laſt being evidently a geometrical ſeries, of which the common ratio is $\frac{1}{1+\frac{1}{a}}$, its ſum is

$$1+\frac{1}{a}-\frac{1}{\left(1+\frac{1}{a}\right)^{n-1}};$$

therefore, the ſum of the ſeries

$$\frac{1}{a}+\frac{1}{a+1}+\frac{1}{a+2}+\frac{1}{a+3}\cdots+\frac{1}{a+n-1}$$

will always be greater than this expreſſion; but if we ſuppoſe n ſo great that the quantity $\left(1+\frac{1}{a}\right)^{n-1}$ is equal to, or exceeds a, which is evidently always poſſible, then the above expreſſion for the ſum of the geometrical ſeries will be equal to 1, or will exceed 1; therefore, the ſame number of terms of the ſeries $\frac{1}{a}+\frac{1}{a+1}+\frac{1}{a+2}+\frac{1}{a+3}+$, &c. will always exceed 1; now this is the property of the ſeries we propoſed to demonſtrate.

When $a=\left(1+\frac{1}{a}\right)^{n-1}$, then $a^2=a\left(1+\frac{1}{a}\right)^{n-1}$, but this quantity is greater than $a+n-1$ the denominator of the laſt term of the ſeries

$$\frac{1}{a}+\frac{1}{a+1}+\frac{1}{a+2}+\frac{1}{a+3}\cdots+\frac{1}{a+n-1},$$

the ſum of which, we have proved, will upon that hypotheſis exceed unity; much more then will the ſum exceed unity if we ſuppoſe the ſeries continued until the denominator of its laſt term be equal to, or greater than a^2.

Hence, beginning with the term $\frac{1}{2}$, it appears that

$$\tfrac{1}{2}+\tfrac{1}{3}+\frac{1}{4=2^2}>1,$$

$$\tfrac{1}{5}+\tfrac{1}{6}\cdots+\frac{1}{25=5^2}>1,$$

$$\tfrac{1}{26}+\tfrac{1}{27}\cdots+\frac{1}{676=26^2}>1,$$

$$\tfrac{1}{677}+\tfrac{1}{678}\cdots+\frac{1}{458329=677^2}>1,$$

&c.

Although the ſum of the ſeries we have been conſidering is infinite, yet it evidently increaſes very ſlowly; indeed it is a limit to all ſuch as have a finite ſum; for every

Series. every infinite ſeries, the terms of which decreaſe faſter than the reciprocals of an arithmetical progreſſion, is always finite.

(17.) We have already explained what is meant by a *recurring ſeries*, (2.) we ſhall now treat briefly, firſt, of their origin, next of the way in which they may be ſummed, and laſtly, of the manner of determining the *general term* of any particular ſeries.

The ſeries which is produced by the developement of a rational algebraic fraction has always the property which conſtitutes the characteriſtic of the claſs called *Recurring*, (2.) and on the other hand, any ſeries having that property being propoſed, an algebraic fraction may be found by the expanſion of which the ſeries ſhall be produced.

The fraction $\frac{1+2x}{1-x-x^2}$, for example, by dividing the numerator by the denominator is converted into the infinite ſeries.

$$1+3x+4x^2+7x^3+11x^4+18x^5+, \text{ \&c.}$$

which is of ſuch a nature that if T, T′, T″, denote any three of its ſucceeding terms, their relation to one another is expreſſed by the equation

$$T''=Tx^2+T'x.$$

If we employ algebraic diviſion to convert the fraction into a ſeries, the law of its terms will not appear ſo readily as if we uſe the method of indeterminate coefficients. By this method we aſſume the fraction

$$=A+Bx+Cx^2+Dx^3+Ex^4, + \text{ \&c.}$$

and hence, multiplying by the denominator, and bringing all the terms to one ſide, as explained in ALGEBRA, § 261, we have

$$\left.\begin{matrix}A+B\\-1-A\\-2\end{matrix}\right\}x\left.\begin{matrix}+C\\-B\\-A\end{matrix}\right\}x^2\left.\begin{matrix}+D\\-C\\-B\end{matrix}\right\}x^3+ \text{ \&c.}=0,$$

and hence,

$$A-1=0, \qquad C-B-A=0,$$
$$B-A-2=0, \qquad D-C-B=0,$$
$$\text{\&c.}$$

From theſe equations it appears that the law of the ſeries is ſuch as we have aſſigned.

The equation expreſſing the relation which ſubſiſts among a certain number of ſucceeding terms of a recurring ſeries, is called its *ſcale of Relation*. The ſame name is alſo ſometimes given to the equation expreſſing the connection of the coefficients of the terms. Thus the ſcale of relation of the foregoing ſeries is either

$$T''=Tx+T'x^2,$$

where T, T′, and T″ denote any three ſucceeding terms of the ſeries, or it is

$$R=P+Q,$$

where P, Q and R denote their numeral coefficients.

(18.) We come next to ſhew how the ſum of any propoſed number of terms of a recurring ſeries may be found. Let the ſeries continued to n terms be

$$T_{(1)}+T_{(2)}+T_{(3)}\cdots+T_{(n-2)}+T_{(n-1)}+T_{(n)},$$

where the characters $T_{(1)}$, $T_{(2)}$, &c. denote the ſucceſſive terms, and the numbers (1), (2), &c. their order or place; and as whatever number of terms is contained in the ſcale, the manner of ſumming the ſeries is the ſame, we ſhall in what follows, for the ſake of brevity, ſuppoſe that it conſiſts of three, in which caſe it may be expreſſed thus, Series.

$$pT_{(n-2)}+qT_{(n-1)}+rT_{(n)}=0,$$

where p, q, r denote certain given quantities.

The ſcale of relation affords the following ſeries of equations,

$$\begin{aligned}&pT_{(1)}+qT_{(2)}+rT_{(3)}=0,\\&pT_{(2)}+qT_{(3)}+rT_{(4)}=0,\\&pT_{(3)}+qT_{(4)}+rT_{(5)}=0,\\&\cdots\cdots\cdots\\&pT_{(n-2)}+qT_{(n-1)}+rT_{(n)}=0.\end{aligned}$$

Taking now the ſum of theſe equations, we get

$$\left.\begin{matrix}p(T_{(1)}+T_{(2)}+T_{(3)}\cdots+T_{(n-2)})\\+q(T_{(2)}+T_{(3)}+T_{(4)}\cdots+T_{(n-1)})\\+r(T_{(3)}+T_{(4)}+T_{(5)}\cdots+T_{(n)})\end{matrix}\right\}=0.$$

But, putting s for the ſum of n terms of the ſeries, this equation may manifeſtly be expreſſed thus,

$$\left.\begin{matrix}p(s-T_{(n)}-T_{(n-1)})\\+q(s-T_{(1)}-T_{(n)})\\+r(s-T_{(1)}-T_{(2)})\end{matrix}\right\}=0.$$

Hence, after reduction, we find $s=$

$$\frac{p(T_{(n-1)}+T_{(n)})+q(T_{(1)}+T_{(n)})+r(T_{(1)}+T_{(2)})}{p+q+r},$$

From which it appears that in this caſe the ſum depends only on the two firſt and the two laſt terms of the ſeries.

EXAMPLE. It is propoſed to find from this formula the ſum of n terms of the ſeries

$$1+2x+3x^2+4x^3+5x^4+ \text{ \&c.}$$

its ſcale of relation being

$$x^2T_{(n-2)}-2xT_{(n-1)}+T_{(n)}=0.$$

Here $p=x^2$, $q=-2x$, $r=1$, therefore, obſerving that the laſt two terms of the ſeries muſt be $(n-1)x^{n-2}$ and nx^{n-1}, we have, after ſubſtituting and reducing,

$$s=\frac{1-(n+1)x^n+nx^{n+1}}{1-2x+x^2}.$$

This formula will not apply in the caſe of $x=1$, becauſe then the numerator and denominator are each $=0$: but in ſuch caſes as this we may find the value of the function which expreſſes the ſum by what is delivered at § 90, FLUXIONS.

(19.) The proceſs by which we have determined the value of n terms of the ſeries $T_{(1)}+T_{(2)}+T_{(3)}+$ &c. will alſo apply to the finding the rational fraction from which the ſeries may be deduced, which is alſo the ſum of the ſeries continued *ad infinitum*. For in this caſe the equation from which we have deduced the ſum being

$$\left.\begin{matrix}p(T_{(1)}+T_{(2)}+T_{(3)}+\text{ \&c.})\\+q(T_{(2)}+T_{(3)}+T_{(4)}+\text{ \&c.})\\+r(T_{(3)}+T_{(4)}+T_{(5)}+\text{ \&c.})\end{matrix}\right\}=0,$$

Series. that is,

$$p s+q(s-T_{(1)})+r(s-T_{(1)}-T_{(2)})=0,$$

we have

$$s=\frac{(q+r)T_{(1)}+r\,T_{(2)}}{p+q+r}.$$

For example, let it be required to find the fraction, which being developed produces the ſeries

$$1+2x+3x^2+4x^3+, \&c.$$

the ſcale of relation of which is

$$x^2\,T_{(n-2)}-2x\,T_{(n-1)}+T_{(n)}+0.$$

Here $p=x^2$, $q=-2x$, $r=1$, $T_{(1)}=1$, $T_{(2)}=2x$; therefore, ſubſtituting in the formula, we get

$$\frac{1}{1-2x+x^2}=\frac{1}{(1-x)^2}$$

for the fraction required, or for the ſum of the ſeries continued *ad infinitum*.

(20.) We come now to the laſt branch of the theory of recurring ſeries which we propoſed to conſider, namely, how to find in any caſe the *general term*.

We ſhall begin with the moſt ſimple, and ſuppoſe the fraction to be $\frac{a}{1-px}$, which being expounded into a ſeries by diviſion, is

$$a+apx+ap^2x^2+ap^3x^3+, \&c.$$

here it is immediately manifeſt that the general term is $ap^{n-1}x^{n-1}$.

Next let us ſuppoſe the fraction to be $\frac{a+bx}{1-\alpha x-\beta x^2}$. Let the two roots of the quadratic equation $1-\alpha x-\beta x^2=0$ be $x=\frac{1}{p}$, $x=\frac{1}{q}$, ſo that $1-px=0$, and $1-qx=0$; therefore, $1-\alpha x-\beta x^2=(1-px)(1-qx)$, thus, we have

$$\frac{a+bx}{1-\alpha x-\beta x^2}=\frac{a+bx}{(1-px)(1-qx)}.$$

Let us aſſume this expreſſion equal to

$$\frac{P}{1-px}+\frac{Q}{1-qx},$$

where P and Q denote quantities which are to be independent of x, then, reducing to a common denominator, we have

$$\frac{a+bx}{(1-px)(1-qx)}=\frac{P+Q-(qP+pQ)x}{(1-px)(1-qx)}.$$

Hence, that x may remain indeterminate, we muſt make

$$P+Q=a,\ qP+pQ=-b,$$

and from theſe equations we get

$$P=\frac{ap+b}{p-q},\ Q=-\frac{aq+b}{p-q}.$$

Now, by the operation of diviſion, we find

$$\frac{P}{1-px}=P+Pp\,x+Pp^2x^2+, \&c.$$

Series.

$$\frac{Q}{1-qx}=Q+Qqx+Qq^2x^2+, \&c.$$

therefore, ſince $\frac{a+bx}{1-\alpha x-\beta x^2}=\frac{P}{1-px}+\frac{Q}{1-qx}$, it follows that the developement of the fraction $\frac{a+bx}{1-\alpha x-\beta x^2}$ which proceeds according to the powers of x, is

$$(P+Q)Pp+Qq)\,x+(Pp^2+Qq^2)\,x^2 +(Pp^3+Qq^3)\,x^3+, \&c.$$

And here it is evident that the general term is $(Pp^{n-1}+Qq^{n-1})x^{n-1}$.

Let us take as a particular example the fraction $\frac{1-x}{1-x-2x^2}$, which, when expanded into a ſeries, becomes

$$1+0x+2x^2+2x^3+6x^4+10x^5 +22x^6+42x^7+86x^8+, \&c.$$

Here, from the equation $1-x-2x^2=0$, we get $x=\frac{1}{2}$ and $x=-1$, ſo that $1-2x$ and $1+x$ are diviſors of the function $1-x-2x^2$, that is, $1-x-2x^2=(1+x)(1-2x)$; hence $p=-1$, $q=2$, and ſince $a=1$, $b=-1$; therefore $P=\frac{2}{3}$, $Q=\frac{1}{3}$, and the general term $(Pp^{n-1}+Qq^{n-1})x^{n-1}$ becomes by ſubſtituting

$$\left\{\frac{2}{3}(-1)^{n-1}+\frac{1}{3}2^{n-1}\right\}x^{n-1}=\frac{2^{n-1}\pm 2}{3}x^{n-1},$$

where the ſign + is to be taken when n is an odd number; but the ſign — when n is even.

Sometimes the values of p and q will come out imaginary quantities; theſe, however, will be found always to deſtroy one another when ſubſtituted in the general term.

Let us next ſuppoſe the fraction which produces a recurring ſeries to be

$$\frac{a+b\,x+c\,x^2}{1-\alpha\,x-\beta\,x^2-\gamma\,x^3}.$$

Let $x=\frac{1}{p}$, $x=\frac{1}{q}$, $x=\frac{1}{r}$ be the three roots of the cubic equation $1-\alpha x-\beta x^2-\gamma x^3=0$, then the denominator of the fraction will be the product of the three factors

$$1-px,\ 1-qx,\ 1-rx.$$

We muſt now aſſume the fraction equal to the expreſſion

$$\frac{P}{1-px}+\frac{Q}{1-qx}+\frac{R}{1-rx};$$

in which P, Q, R denote quantities which are independent of x.

The three terms of this expreſſion are next to be reduced to a common denominator and collected into one, and the coefficients of the powers of x in the numerator of the reſult are to be put equal to the like powers of x in the propoſed fraction, we ſhall then have

P+

Series.

$$P+Q+R=a,$$
$$(q+r)P+(p+r)Q+(p+q)R=-b,$$
$$qr\,P+pr\,Q+pq\,R=c,$$

and by theſe equations the values of P, Q, R may be found.

Let $\frac{P}{1-px}$, $\frac{Q}{1-qx}$, $\frac{R}{1-rx}$ be now reſolved into ſeries by diviſion; then, adding the like powers of x in each we have

$$(P+Q+R)+(Pp+Qq+Rr)x+(Pp^2+Qq^2+Rr^2)x^2+, \&c.$$

for the ſeries which is the developement of the fraction

$$\frac{a+bx+cx^2}{1-\alpha x-\beta x^2-\gamma x^3}$$

and here the general term is evidently

$$(Pp^{n-1}+Qq^{n-1}+Rr^{n-1})x^{n-1};$$

and in the very ſame manner may the general term be found in every caſe in which the denominator of the fraction admits of being reſolved into unequal factors.

(21.) Let us now ſuppoſe the fraction to have the form $\frac{a+bx}{(1-px)^2}$, the denominator being the product of two equal factors; this fraction cannot be decompoſed into other fractions, the denominators of which are the ſimple factors of its denominator. We may, however, transform it into two, which ſhall have their numerators conſtant quantities by proceeding as follows: Aſſume the numerator $a+bx=P+Q(1-px)$, then, that x may remain indeterminate, we muſt have $P+Q=a$, $-pQ=b$, therefore

$$Q=-\frac{b}{p},\quad P=a+\frac{b}{p}.$$

The aſſumption of $a+bx=P+Q(1-px)$ gives us therefore

$$\frac{a+bx}{(1-px)^2}=\frac{P}{(1-px)^2}+\frac{Q}{1-px}.$$

Now, putting the firſt term of the latter ſide of this equation under the form $P(1-px)^{-2}$, it is reſolved by the binomial theorem into the ſeries

$$P(1+2px+3p^2x^2+4p^3x^3+, \&c.);$$

the other fraction $\frac{Q}{1-px}$ being expanded into a ſeries is

$$Q+Qpx+Qp^2x^2+, \&c.$$

Therefore, the complete developement of $\frac{a+bx}{(1-px)^2}$ is

$$P+Q+(2P+Q)px+(3P+Q)p^2x^2+, \&c.$$

and here the general term is manifeſtly $(nP+Q)p^{n-1}x^{n-1}$, or, ſubſtituting for P and Q their values,

$$\{np\,a+(n-1)b\}p^{n-2}x^{n-1}.$$

(22.) In general, whatever be the form of the fraction from which a recurring ſeries is derived, to determine the general term we muſt decompoſe the fraction into others which may be as ſimple as poſſible; and provided it be rational, and the higheſt power of x in the numerator at leaſt one degree leſs than the higheſt power in the denominator, it may be always decompoſed into others having one or other of theſe two forms

Series.

$$\frac{P}{1-px},\quad \frac{Q}{(1-qx)^n},$$

in which expreſſions P, Q, p, and q, denote quantities independent of x. Each partial fraction gives a recurring ſeries, the general term of which will be ſufficiently obvious; and as the ſeries belonging to the original fraction, is the ſum of theſe ſeries, ſo alſo its general term will be the ſum of all their general terms.

We have now treated of ſome of the more general methods of ſumming ſeries which admit of being explained by the common principles of algebra; but the ſubject is of great extent, and to treat of it ſo as to give a tolerable notion of its various branches, would require more room than could with propriety be ſpared on ſuch a work as ours.

(23). The fluxionary calculus affords a method, almoſt the only general one we poſſeſs, of ſumming ſeries. The general principles upon which it is applied may be ſtated briefly as follows. Since the fluent of any fluxion containing one variable quantity may always be expreſſed by a ſeries, on the contrary every ſeries may be regarded as the expreſſion of a fluent: when any ſeries then is propoſed, we muſt endeavour to find the fluxional expreſſion of which that ſeries is the fluent; and as we can always find the fluent of a fluxion, at leaſt by approximation, within given limits; we may thence determine, if not the exact, at leaſt the approximate value of any infinite ſeries. We ſhall now ſhew how this principle may be applied in ſome particular caſes.

PROBLEM I. It is propoſed to find the ſum of n terms of the ſeries

$$x+2x^2+3x^3+4x^4\cdots+nx^n.$$

Let the ſum be denoted by s. Then, multiplying all the terms by $\frac{\dot{x}}{x}$ we have

$$\frac{s\dot{x}}{x}=\dot{x}+2x\dot{x}+3x^2\dot{x}+4x^3\dot{x}\cdots+nx^{n-1}\dot{x}$$

Let the fluent of both ſides be now taken, and the reſult is

$$\int\frac{s\dot{x}}{x}=x+x^2+x^3+x^4\cdots+x^n.$$

Now the ſeries on the right-hand ſide of this equation is a geometrical progreſſion, the ſum of which is known to be $\frac{x-x^{n+1}}{1-x}$, (ALGEBRA, § 106). Therefore,

$$\int\frac{s\dot{x}}{x}=\frac{x-x^{n+1}}{1-x},$$

and

Series. and, taking the fluxions,

$$\frac{\dot{s}\dot{x}}{x} = \frac{\dot{x} - (n+1)x^n\dot{x} + nx^{n+1}\dot{x}}{(1-x)^2}.$$

Hence we find

$$s = \frac{x - (n+1)x^{n+1} + nx^{n+2}}{(1-x)^2}.$$

This result agrees with that formerly found (17.) of this article.

Problem II. It is proposed to sum the infinite series

$$1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} +, \&c.$$

We may consider this series as a particular case of the more general series,

$$x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} +, \&c.$$

namely, that in which $x=1$. Putting therefore the sum $=s$, and taking the fluxions, we have

$$\dot{s} = \dot{x}(1 - x^2 + x^4 - x^6 +, \&c.).$$

Now the series in the parenthesis is obviously the developement of the rational fraction $\frac{1}{1+x^2}$ therefore, $\dot{s} = \frac{\dot{x}}{1+x^2}$, and taking the fluent $s = \text{arc (tan.} = x) + c$, radius being unity. (Fluxions § 60.) Now when $x=0$, all the terms of the series vanish, so that in this case $s=0$; and as when $x=0$, arc. (tan. $=x$)$=0$; therefore c, the constant quantity added to complete the fluent is 0, and we have simply $s = \text{arc. (tan.} = x)$, and when $x=1$, then $s = \frac{1}{2}$ a quadrant $=.7853982$.

Problem III. Required the sum of the infinite series

$$\frac{x}{1\cdot 2} + \frac{x^2}{2\cdot 3} + \frac{x^3}{3\cdot 4} + \frac{x^4}{4\cdot 5} +, \&c.$$

Putting s for the sum, and taking the fluxions, we get

$$\dot{s} = \frac{\dot{x}}{x^2}\left(\frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4} + \frac{x^5}{5} +, \&c.\right)$$

Now the series in the parenthesis is evidently equal to $-x -$ Nap. log. $(1-x)$. (see Logarithms, page 76. column 1.); therefore

$$\dot{s} = -\frac{\dot{x}}{x} - \frac{\dot{x}}{x^2} \times \text{Nap. log. } (1-x).$$

To find the fluent, let us put v for the function $\frac{1}{x}\log.(1-x)$, then, taking its fluxion we have

$$\dot{v} = -\frac{\dot{x}}{x^2} \times \log.(1-x) - \frac{\dot{x}}{x(1-x)},$$

and $-\frac{\dot{x}}{x^2} \times \log.(1-x) = \dot{v} + \frac{\dot{x}}{x(1-x)}$,

therefore, substituting, we get

$$\dot{s} = \dot{v} + \frac{\dot{x}}{x(1-x)} - \frac{\dot{x}}{x}$$

$$= \dot{v} + \frac{\dot{x}}{1-x};$$

Series.

and taking the fluents,

$$s = v - \log.(1-x) + c$$
$$= \frac{\log.(1-x)}{x} - \log.(1-x) + c.$$

To determine the constant quantity c, let us take $x=0$, then, in this case all the terms of the series vanish so that $s=0$, also log. $(1-x) = \log. 1 = 0$; and since in general $\frac{\log.(1-x)}{x} = \frac{1}{x}\left(-x - \frac{x^2}{2} - \frac{x^3}{3} -, \&c.\right) = -1 - \frac{x}{2} - \frac{x^2}{3} -, \&c.$ when $x=0$, then $\frac{\log.(1-x)}{x} = -1$: therefore $0 = -1 + c$, and $c = 1$; hence it appears that

$$s = \frac{\log.(1-x)}{x} - \log.(1-x) + 1$$
$$= \frac{(1-x)\log.(1-x)}{x} + 1.$$

Example, Let $x = \frac{1}{2}$, then our formula gives

$$\frac{1}{1\cdot 2\cdot 2} + \frac{1}{2\cdot 3\cdot 2^2} + \frac{1}{3\cdot 4\cdot 2^3} + \frac{1}{4\cdot 5\cdot 2^4} +, \&c.$$
$$= 1 - \text{Nap. log. } 2 = .306852819.$$

Problem IV. Let the series to be summed be

$$1 + \frac{m}{n}x + \frac{m+1}{n+1}x^2 + \frac{m+2}{n+2}x^3 +, \&c.$$

Putting s for this series let all its terms be multiplied by x^{n-1} so that the exponent of x in each may be identical with its denominater, the result is

$$sx^{n-1} = x^{n-1} + \frac{m}{n}x^n + \frac{m+1}{n+1}x^{n+1} + \frac{m+2}{n+2}x^{n+2} +, \&c.$$

and hence taking the fluxions

$$\dot{s}x^{n-1} + (n-1)s\dot{x}x^{n-2} = (n-1)\dot{x}x^{n-2} + m\dot{x}x^{n-1}$$
$$+ (m+1)\dot{x}x^n + (m+2)\dot{x}x^{n+1} +, \&c.$$

Let both sides of this equation be now multiplied by x^{m-n}, and it becomes

$$\dot{s}x^{m-1} + (n-1)s\dot{x}x^{m-2} = (n-1)\dot{x}x^{m-2} + m\dot{x}x^{m-1}$$
$$+ (m+1)\dot{x}x^m + (m+2)\dot{x}x^{m+1} +, \&c.$$

Putting now the single character $\dot{p}$ for the fluxional expression which forms the first member of this equation, we get by taking the fluents of both sides,

$$p = \frac{n-1}{m-1}x^{m-1} + x^m + x^{m+1} + x^{m+2} +, \&c.$$
$$= \frac{n-1}{m-1}x^{m-1} + x^m(1 + x + x^2 + x^3 +, \&c),$$

but the series in the parenthesis is the developement of $\frac{1}{1-x}$, therefore

$$p = \frac{n-1}{m-1}x^{m-1} + \frac{x^m}{1-x};$$

taking

Series. taking now the fluxions, and ſubſtituting inſtead of $\dot{p}$ the expreſſion it was put to repreſent, we get

$$\dot{s}x^{m-1}+(n-1)s\dot{x}x^{m-2}$$
$$=(n-1)\dot{x}x^{m-2}+\frac{m\dot{x}x^{m-1}}{1-x}+\frac{\dot{x}x^{m}}{(1-x)^2},$$

and this, after reduction, becomes

$$\dot{s}+\frac{n-1}{x}s\dot{x}=\frac{(n-1)\dot{x}}{x}+\frac{m\dot{x}}{1-x}+\frac{x\dot{x}}{(1-x)^2}.$$

This fluxional equation being of the firſt degree, and firſt order, its primitive equation may be found (from the general formula given in FLUXIONS, § 182.) to be

$$s=\frac{1}{x^{n-1}}\times\int\left\{(n-1)\dot{x}x^{n-2}+\frac{m\dot{x}x^{n-1}}{1-x}+\frac{\dot{x}x^{n}}{(1-x)^2}\right\};$$

and this again, by remarking that $\int(n-1)\dot{x}x^{n-2}=x^{n-1}$, and that

$$\int\frac{m\dot{x}x^{n-1}}{1-x}=\frac{mx^n}{n(1-x)}-\int\frac{m\dot{x}x^n}{n(1-x)^2},$$

may be reduced to

$$s=1+\frac{mx}{n(1-x)}+\frac{n-m}{nx^{n-1}}\int\frac{x^n\dot{x}}{(1-x)^2}.$$

The remaining fluent $\int\frac{x^n\dot{x}}{(1-x)^2}$ may be found by § 109. FLUXIONS, and it muſt be ſo taken, that after being multiplied by $\frac{n-m}{nx^{n-1}}$, it ſhall vaniſh when $x=0$; for then this hypotheſis will make the whole function which expreſſes the value of s vaniſh, except its firſt term 1, as it ought to do.

Example. Let us ſuppoſe $n=2$, then,

$$\int\frac{x^2\dot{x}}{(1-x)^2}=x+\frac{x}{1-x}+2\log.(1-x),$$

and

$$\frac{2-m}{2x}\int\frac{x^2\dot{x}}{(1-x)^2}=\frac{(2-m)x}{2(1-x)}+\frac{2-m}{x}\log.(1-x),$$

the fluent being here taken as directed. In this caſe then, after collecting the terms, we get s, or

$$1+\frac{m}{2}x+\frac{m+1}{3}x^2+\frac{m+2}{4}x^3+,\ \&c.$$
$$=\frac{1}{1-x}+\frac{(2-m)}{x}\log.(1-x).$$

(24.) There is a branch of the doctrine of ſeries which is of conſiderable importance in pure mathematics as well as in many phyſical inquiries, and in the ſcience of aſtronomy; it is called the *Interpolation* of ſeries.

To interpolate a ſeries is to interpoſe among its terms others which ſhall be ſubject to the ſame law, or which ſhall be formed in the ſame manner as the original terms of the ſeries; or in other words, it is to find the value of one or more terms by means of others which are given, and which may be either at equal or unequal intervals from one another, the places of the given terms as well as of thoſe ſought being ſuppoſed known. Series.

It is eaſy to ſee that this problem may be applied to the conſtruction of logarithmic tables; for we may regard the logarithms of the natural numbers 1, 2, 3, 4, &c. *ad infinitum* as the terms of a particular ſeries of which the numbers themſelves are then the indices. Having given the logarithms of ſome numbers we may by interpolating deduce from them the logarithms of others.

Again, in aſtronomy we may conſider the numbers which expreſs the ſucceſſive obſerved poſitions of a celeſtial body as the terms of a ſeries, their indices being the intervals of time between the obſervations, and ſome aſſumed epoch, and the problem we are conſidering will enable us to determine the poſition at any inſtant different from the times of actual obſervation, provided the intervals between the obſervations be ſmall, and the inſtant for which the poſition is ſought not very remote from thoſe at which the obſervations were made.

(25.) With a view to illuſtrate the nature of the problem to be reſolved, let us conſider ſome particular caſe, as for example the arithmetical ſeries

$$a,\ a+d,\ a+2d,\ a+3d,\ a+4d,\ \&c.$$

Let t and t' be two given terms of the ſeries, which are at any diſtance from one another, and let n and n' be their indices, or numbers which denote their places in the ſeries. Alſo let y be any term whatever and x its index. Then by the nature of an arithmetical ſeries,

$$t=a+(n-1)d,\ t'=a+(n'-1)d,$$
$$y=a+(x-1)d,$$

Now, as there are here three equations, each involving the quantities a and d, we may eliminate both theſe quantities by the common rules, (ALGEBRA, Sect. VII.) and this being done, we get

$$(x-n')(t'-t)=(n'-n)(y-t');$$

and hence we find this expreſſion,

$$y=\frac{x-n'}{n-n'}t+\frac{x-n}{n'-n}t',$$

which is a general formula for interpolating any arithmetical ſeries, and it is obſervable, that it is entirely independent both of the firſt term and common difference.

Example. The 7th term of an arithmetical ſeries is 15, and the 12th term is 25: It is required to find the 10th term.

Here $n=7,\ n'=12,\ x=10;$
$t=15,\ t'=25,\ y$ is ſought.

Therefore by the formula,

$$y=\frac{2}{5}\times 15+\frac{3}{5}\times 25=21,\text{ the anſwer.}$$

(26.) The mode of inveſtigation by which we have found a formula for the interpolation of an arithmetical ſeries will apply alſo to others, if the law according to which the terms are formed be known; in general, however, the law of a ſeries to be interpolated is either

not

Series. not known, or it is not taken into account, and we only conſider the abſolute magnitudes of certain terms, and the numbers expreſſing their places in the ſeries.

Plate ccclxxviii. To reſolve the problem generally with theſe *data*, it is uſual to proceed as follows: Let a ſtraight line, AB, and a point A in it, be aſſumed as given in poſition, and let there be taken the ſegments AD, AD′, AD″, AD‴, &c. proportional to the numbers denoting the places of the terms of a ſeries reckoned from any term aſſumed as a fixed origin, and at the points D, D′, D″ let there be erected perpendiculars proportional to the terms themſelves. Let us now ſuppoſe a curve to paſs through C, C′, C″, C‴, &c. then, if it be ſo choſen that its curvature may vary gradually in its progreſs from point to point, without any very abrupt changes of inflection, and moreover, if the terms (which we may ſuppoſe to be either at equal or unequal diſtances) are pretty near to one another, it is eaſy to conceive, that if AP be taken equal to the number expreſſing the place of a term between C″D″, C‴D‴ any two others, the term itſelf will, if not exactly, at leaſt be nearly expreſſed by PQ, the ordinate to the curve.

As an infinite variety of curves may be found that ſhall paſs through the ſame given points; in this reſpect the problem is unlimited; it is, however, convenient to aſſume ſuch as are ſimple and tractable. The parabolic claſs poſſeſs theſe properties, and accordingly they are commonly employed.

Let us then expreſs the ordinates CD, C′D′, C″D″, C‴D‴, &c. which are the given terms of the ſeries by

$$t,\ t',\ t'',\ t''',\ \&c.$$

and the abſciſſæ AD, AD′, AD″, AD‴, or the numbers denoting the order of the terms by

$$n,\ n',\ n'',\ n''',\ \&c.$$

Put y for PQ, a term to be interpolated, and x for AP its place. Then, conſidering x and y as indefinite co-ordinates, a parabolic curve that ſhall paſs through the points C, C′, C″, C‴, &c. will have for its equation

$$y=A+Bx+Cx^2+Dx^3,\ +,\ \&c.$$

the number of terms on the right-hand ſide being ſuppoſed equal to that of the given points, and A, B, C, &c. being put to denote conſtant quantities. To determine theſe we muſt conſider that when $x=n$, then $y=t$, and that when $x=n'$, then $y=t'$ and ſo on, therefore, ſubſtituting the ſucceſſive correſponding values of x and y we get

$$\begin{aligned}
t &= A+Bn &&+Cn^2 &&+Dn^3 &&+,\ \&c.\\
t' &= A+Bn' &&+Cn'^2 &&+Dn'^3 &&+,\ \&c.\\
t'' &= A+Bn'' &&+Cn''^2 &&+Dn''^3 &&+,\ \&c.\\
t''' &= A+Bn''' &&+Cn'''^2 &&+Dn'''^3 &&+,\ \&c.\\
&\ \&c. &&\ \&c. &&
\end{aligned}$$

this ſeries of equations muſt be continued until their number be the ſame as that of the coefficient, A, B, C, D, &c. If we now conſider t, t', t'', &c. and n, n', n'', &c. as known, and A, B, C, &c. as unknown quantities, we may determine theſe laſt by eliminating them one after another from the above equations, as is taught in ALGEBRA, Sect. XVII. And the values of A, B, C, &c. being thus determined and ſubſtituted in the general equation, we ſhall have a general expreſſion for y in terms of x the number denoting its place and known quantities; and this is in ſubſtance the ſolution originally given of the problem by Sir Iſaac Newton, who propoſed it in the third book of his *Principia* with a view to its application in aſtronomy. Series.

A celebrated foreign mathematician (Lagrange) has, in the *Cahiers de l'Ecole Normale*, given a different form to the expreſſion for y. He has obſerved that ſince, when x becomes n, n', n'', n''', &c. ſucceſſively, then y becomes t, t', t'', t''', &c. It follows that the expreſſion for y muſt have this form.

$$y=\alpha t+\beta t'+\gamma t''+\delta t'''+,\ \&c.$$

where the quantities α, β, γ, &c. muſt be ſuch functions of x, that if we put $x=n$, then $\alpha=1$ and $\beta=0$, $\gamma=0$, &c. and if we put $x=n'$, then $\alpha=0$, $\beta=1$; $\gamma=0$, &c. and again, if we make $x=n''$, then $x=0$, $\beta=0$, $\gamma=1$, &c. and ſo on. Hence it is eaſy to conclude that the values of α, β, γ, &c. muſt have the form

$$\alpha=\frac{(x-n')(x-n'')(x-n''')}{(n-n')(n-n'')(n-n''')},\ \&c.$$

$$\beta=\frac{(x-n)(x-n'')(x-n''')}{(n'-n)(n'-n'')(n'-n''')},\ \&c.$$

$$\gamma=\frac{(x-n)(x-n')(x-n''')}{(n''-n)(n''-n')(n''-n''')},\ \&c.$$

$$\delta=\frac{(x-n)(x-n')(x-n'')}{(n'''-n)(n'''-n')(n'''-n'')},\ \&c.$$

&c.

and here the number of factors in the numerator and denominator muſt be each equal to the number of given points in the curve. This formula would be found to be identical with that which may be obtained by the method indicated in laſt article, if we were to take the actual product of the factors and arrange the whole expreſſion according to powers of x. It poſſeſſes however one advantage over the other, viz. that of admitting of the application of logarithms.

We ſhall now ſhew the application of this formula.

Ex. 1. Having given the logarithms of 101, 102, 104, and 105, it is required to find the logarithm of 103.

In this caſe we may reckon the terms of the ſeries forward from the firſt given term, viz. log. 101, ſo that we have

t = log. 101 = 2.0043214,	$n=0$,
t' = log. 102 = 2.0086002,	$n'=1$,
y = log. 103 = term ſought,	$x=2$,
t'' = log. 104 = 2.0170333,	$n''=3$,
t''' = log. 105 = 2.0211893,	$n'''=4$.

Subſtituting now in the general formula we get

$$\alpha=\frac{1\times-1\times-2}{-1\times-3\times-4}=-\frac{1}{6},\quad \gamma=\frac{2\times1\times-2}{3\times2\times-1}=\frac{2}{3},$$

$$\beta=\frac{2\times-1\times-2}{1\times-2\times-3}=\frac{2}{3},\quad \delta=\frac{2\times1\times-1}{4\times3\times1}=-\frac{1}{6},$$

Therefore $y=-\frac{t}{6}+\frac{2t'}{3}+\frac{2t''}{3}-\frac{t'''}{6}$

$=\frac{2}{3}(t'+t'')-\frac{1}{6}(t+t''')$

$=2.0128372$ the anſwer.

Ex.

Series, Seringapatam.

Ex. 2. Given a comet's diſtance from the ſun on the following days at 12 at night, to find its diſtance December 20th.

December 12. diſtance 301, Dec. 24. diſtance 715,
21. 620, 26. 772.

Here we ſhall eſtimate the places of the terms from the time of the firſt poſition, viz. December 12. Therefore

$t = 301$, $n = 0$,
y is ſought, $x = 8$,
$t' = 620$, $n' = 9$,
$t'' = 715$, $n'' = 12$,
$t''' = 772$, $n''' = 14$.

In this caſe the general formula gives us

$$\alpha = \frac{1}{63}, \beta = \frac{6}{45}, \gamma = -\frac{2}{3}, \delta = \frac{8}{35},$$

therefore

$$y = \frac{t}{63} + \frac{64t'}{45} - \frac{2t''}{3} + \frac{8t'''}{35}.$$
$$= 586.3 \text{ the anſwer.}$$

We ſhall conclude this article with a brief enumeration of the beſt works on the ſubject which we have been treating of.

Ars Conjectandi, (Jac. Bernoulli). *Methodus Differentialis*, (Newton). *Methodus Incrementorum*, (Taylor). *Methodus Differentialis, ſive Tractatus de Summatione et Interpolatione Serierum*, (Stirling). *Inſtitutiones Calcul. Diff.* (Euler). *Emerſon's Method of Increments.* The differential method, (ſame author). *Miſcellanea Analytica* (De Moivre). The various writings of Landen and Simpſon. *Theorie des Fonctions Analytiques*, (Lagrange). *Du Calcul des Derivation*, (Arbogart). *Traité des differences et des Series*, (a ſequel to Lacroix's work on the *Calcul Differential*, &c.). Dr Hutton's Mathematical and Philoſophical Tracts. An Eſſay on the Theory of the various orders of Logarithmic Tranſcendents, with an Inquiry into their applications to the Integral Calculus, and the Summation of Series, by W. Spence, &c. &c.

SERINGAPATAM, the capital of Myſore, formerly the dominions of Tippoo Sultan, is ſituated in an iſland of the Cavery river, about 290 or 300 miles from Madras, and in N. Lat. 12° 32′ and E. Long. 96° 47′, about four miles in length, by one and a half in breadth, acroſs the middle, where it is likewiſe higheſt, whence it gradually falls and narrows towards the extremities. The weſt end of the iſland, on which there is a fort of conſiderable ſtrength, ſlopes more, eſpecially towards the north; and the ground riſing on the oppoſite ſide of the river commands a diſtinct view of every part of the fort. The fort and outworks occupy about a mile of the weſt end of the iſland, and are diſtinguiſhed by magnificent buildings, and ancient Hindoo pagodas, contraſted with the more lofty and ſplendid monuments lately raiſed in honour of the Mahometan faith. The great garden, called the *Laul Baug*, covers about as much of the eaſt end of the iſland as the fort and outworks do of the weſt; and the whole intermediate ſpace, except a ſmall incloſure on the north bank near the fort, was, before the laſt war, filled with houſes, and formed an extenſive ſuburb, of which the greateſt part was deſtroyed by Tippoo to make room for batteries to defend the iſland when attacked by the combined forces of Earl Cornwallis and the Mahratta chiefs in February 1792. This ſuburb, or town of modern ſtructure, is about half a mile ſquare, divided into regular croſs ſtreets, all wide, and ſhaded on each ſide by trees. It is ſurrounded by a ſtrong mud wall, contains many good houſes, and ſeems to have been preſerved by the Sultan for the accommodation of merchants, and for the convenience of troops ſtationed on that part of the iſland for its defence. A little to the eaſtward of the town is the entrance to the great garden, which was laid out in regular ſhady walks of large cypreſs trees, and abounding with fruit-trees, flowers, and vegetables of every deſcription. It poſſeſſed all the beauty and elegance of a country retirement, and was dignified by the mauſoleum of Hyder, and a ſuperb new palace built by his ſon. This noble garden was devoted to deſtruction; and the trees which had ſhaded their proud maſter, and contributed to his pleaſures, were formed into the means of protecting his enemies in ſubverting his empire. "Before that event, ſo glorious to the arms of England, this inſulated metropolis (ſays Major Dirom) muſt have been the richeſt, moſt convenient, and beautiful ſpot poſſeſſed in the preſent age by any native prince in India; but when the allies left it, the Sultan's fort and city only remained in repair amidſt all the wrecks of his former grandeur, the iſland preſenting nothing but the appearance of wretched barrenneſs. Tippoo is a man of talents, enterpriſe, and great wealth; but, in the opinion of our author, the remaining years of his ill-fated life will be unequal to renew the beauties of his terreſtrial paradiſe." This prediction was more than verified in the fate of Tippoo; for he loſt his life in bravely defending his capital, which was taken by aſſault in 1799 by the Britiſh troops under General Baird. See India, N° 183.

Seringapatam, Seringham.

SERINGHAM, an iſland of Indoſtan, formed about ſix miles north-weſt of Trinchinopoly by the river Cavery, which divides itſelf into two branches: that to the northward takes the name of *Coleroon*, but the ſouthern branch preſerves its old name the *Cavery*. Each of theſe rivers, after a courſe of about 90 miles, empty themſelves into the ſea; the Coleroon at Devicottah, and the Cavery near Tranquebar, at about 20 miles diſtance from one another. In this iſland, facing Trinchinopoly, ſtood a famous pagoda ſurrounded by ſeven ſquare walls of ſtone, 25 feet high and four feet thick. The ſpace between the outward and ſecond walls meaſured 310 feet, and ſo proportionably of the reſt. Each incloſure had four large gates, with a high tower; which were placed, one in the middle of each ſide of the incloſure, and oppoſite to the four cardinal points. The outward wall was about four miles in circumference, and its gateway to the ſouth was ornamented with pillars, ſome of which were ſingle ſtones 33 feet in length and five in diameter; while thoſe that formed the roof were ſtill larger; and in the inmoſt incloſure were the chapels.—About half a mile to the eaſt was another large pagoda called *Jumbikiſtna*, which had but one incloſure.

The pagoda of Seringham was held in great veneration, from a belief that it contained the identical image

Seringham || Serpens.

of the god Wiſtnou worſhipped by Brama; and pilgrims came here from all parts of India with offerings of money to procure abſolution. A large part of the revenue of the iſland was allotted for the maintenance of the Bramins who inhabited the pagoda; and theſe, with their families, formerly amounted to no fewer than 40,000 perſons, all maintained by the ſuperſtitious liberality of the adjacent country.

SERIOLA, a genus of plants belonging to the claſs ſyngeneſia, and in the natural ſyſtem ranged under the 49th order, *Compoſitæ*. See BOTANY *Index*.

SERIPHIUM, a genus of plants belonging to the claſs ſyngeneſia. See BOTANY *Index*.

SERIPHUS, in *Ancient Geography*, one of the Cyclades or iſlands in the Ægean ſea, called *Saxum Seriphium* by Tacitus, as if all a rock; one of the uſual places of baniſhment among the Romans. The people, *Seriphii*; who, together with the Siphnii, joined Greece againſt Xerxes, were almoſt the only iſlanders who refuſed to give him earth and water in token of ſubmiſſion, (Herodotus). *Seriphia Rana*, a proverbial ſaying concerning a perſon who can neither ſing nor ſay; frogs in this iſland being ſaid to be dumb, (Pliny).

SERMON, a diſcourſe delivered in public, for the purpoſe of religious inſtruction and improvement.

Funeral SERMON. See *FUNERAL Orations*.

SERON OF ALMONDS, is the quantity of two hundred weight; of aniſe ſeed, it is from three to four hundred; of Caſtile ſoap, from two hundred and a half to three hundred and three quarters.

SEROSITY, in *Medicine*, the watery part of the blood.

SERPENS, in *Aſtronomy*, a conſtellation in the northern hemiſphere, called more particularly *Serpens Ophiuchi*. The ſtars in the conſtellation Serpens, in Ptolemy's catalogue, are 18; in Tycho's, 13; in Hevelius's, 22; and in the Britannic catalogue, 64.

SERPENS Biceps, or *Double-headed Snake*; a monſter of the ſerpent kind, of which ſome individuals are deſcribed by naturaliſts.

SERPENTES, *Serpents*, in the Linnæan ſyſtem of zoology, an order of animals belonging to the claſs of *amphibia*. See OPHIOLOGY.

The ſerpent has been always conſidered the enemy of man; and it has hitherto continued to terrify and annoy him, notwithſtanding all the arts which have been practiſed to deſtroy it. Formidable in itſelf, it deters the invader from the purſuit; and from its figure, capable of finding ſhelter in a little ſpace, it is not eaſily diſcovered by thoſe who would venture to encounter it. Thus poſſeſſed at once of potent arms, and inacceſſible or ſecure retreats, it baffles all the arts of man, though ever ſo earneſtly bent upon its deſtruction. For this reaſon, there is ſcarcely a country in the world that does not ſtill give birth to this poiſonous brood, that ſeems formed to quell human pride, and repreſs the boaſts of ſecurity. Mankind have driven the lion, the tiger, and the wolf, from their vicinity; but the ſnake and the viper ſtill defy their power.

Their numbers, however, are thinned by human aſſiduity; and it is poſſible ſome of the kinds are wholly deſtroyed. In none of the countries of Europe are they ſufficiently numerous to be truly terrible. The various malignity that has been aſcribed to European ſerpents of old is now utterly unknown; there are not above three or four kinds that are dangerous, and their poiſon operates in all in the ſame manner. The drowſy death, the ſtarting of the blood from every pore, the inſatiable and burning thirſt, the melting down the ſolid maſs of the whole form into one heap of putrefaction, ſaid to be occaſioned by the bites of African ſerpents, are horrors with which we are entirely unacquainted, and are perhaps only the creatures of fancy. Serpens.

But though we have thus reduced theſe dangers, having been incapable of wholly removing them, in other parts of the world they ſtill rage with all their ancient malignity. In the warm countries that lie within the tropics, as well as in the cold regions of the north, where the inhabitants are few, the ſerpents propagate in equal proportion. But of all countries thoſe regions have them in the greateſt abundance where the fields are unpeopled and fertile, and where the climate ſupplies warmth and humidity. All along the ſwampy banks of the river Niger or Oroonoko, where the ſun is hot, the foreſts thick, and the men but few, the ſerpents cling among the branches of the trees in infinite numbers, and carry on an unceaſing war againſt all other animals in their vicinity. Travellers have aſſured us, that they have often ſeen large ſnakes twining round the trunk of a tall tree, encompaſſing it like a wreath, and thus riſing and deſcending at pleaſure.—We are not, therefore, to reject as wholly fabulous the accounts left us by the ancients of the terrible devaſtations committed by a ſingle ſerpent. It is probable, in early times, when the arts were little known, and mankind were but thinly ſcattered over the earth, that ſerpents, continuing undiſturbed poſſeſſors of the foreſt, grew to an amazing magnitude; and every other tribe of animals fell before them. It then might have happened, that ſerpents reigned the tyrants of a diſtrict for centuries together. To animals of this kind, grown by time and rapacity to 100 or 150 feet in length, the lion, the tiger, and even the elephant itſelf, were but feeble opponents. That horrible fœtor, which even the commoneſt and the moſt harmleſs ſnakes are ſtill found to diffuſe, might, in theſe larger ones, become too powerful for any living being to withſtand; and while they preyed without diſtinction, they might thus alſo have poiſoned the atmoſphere around them. In this manner, having for ages lived in the hidden and unpeopled foreſt, and finding, as their appetites were more powerful, the quantity of their prey decreaſing, it is poſſible they might venture boldly from their retreats into the more cultivated parts of the country, and carry conſternation among mankind, as they had before deſolation among the lower ranks of nature. We have many hiſtories of antiquity, preſenting us ſuch a picture, and exhibiting a whole nation ſinking under the ravages of a ſingle ſerpent. At that time man had not learned the art of uniting the efforts of many to effect one great purpoſe. Oppoſing multitudes only added new victims to the general calamity, and increaſed mutual embarraſſment and terror. The animal was therefore to be ſingly oppoſed by him who had the greateſt ſtrength, the beſt armour, and the moſt undaunted courage. In ſuch an encounter, hundreds muſt have fallen; till one, more lucky than the reſt, by a fortunate blow, or by taking the monſter in its torpid interval, and ſurcharged with ſpoil, might kill, and thus rid his country

Serpens, Serpent.

country of the deſtroyer. Such was the original occupation of heroes; and thoſe who firſt obtained that name, from their deſtroying the ravagers of the earth, gained it much more deſervedly than their ſucceſſors, who acquired their reputation only for their ſkill in deſtroying each other. But as we deſcend into more enlightened antiquity, we find theſe animals leſs formidable, as being attacked in a more ſucceſsful manner. We are told, that while Regulus led his army along the banks of the river Bagrada in Africa, an enormous ſerpent diſputed his paſſage over. We are aſſured by Pliny, that it was 120 feet long, and that it had deſtroyed many of the army. At laſt, however, the battering engines were brought out againſt it; and theſe aſſailing it at a diſtance, it was ſoon deſtroyed. Its ſpoils were carried to Rome, and the general was decreed an ovation for his ſucceſs. There are, perhaps, few facts better aſcertained in hiſtory than this: an ovation was a remarkable honour; and was given only for ſome ſignal exploit that did not deſerve a triumph: no hiſtorian would offer to invent that part of the ſtory at leaſt, without being ſubject to the moſt ſhameful detection. The ſkin was kept for ſeveral years after in the Capitol; and Pliny ſays he ſaw it there. At preſent, indeed, ſuch ravages from ſerpents are ſcarcely ſeen in any part of the world; not but that, in Africa and America, ſome of them are powerful enough to brave the aſſaults of men to this day.

—Nequeunt expleri corda tuendo
Terribiles oculos, vultum villoſaque ſetis
Pectora.— VIRGIL.

We have given a place to the preceding remarks, not ſo much for their accuracy as to ſhow what were formerly the ſentiments of mankind concerning this tribe of animals.

SERPENT, a muſical inſtrument, ſerving as a baſs to the cornet, or *ſmall ſhawm*, to ſuſtain a chorus of ſingers in a large edifice. It has its name *ſerpent* from its figure, as conſiſting of ſeveral folds or wreaths, which ſerve to reduce its length, which would otherwiſe be ſix or ſeven feet.

It is uſually covered with leather, and conſiſts of three parts, a mouth-piece, a neck, and a tail. It has ſix holes, by means whereof it takes in the compaſs of two octaves.

Merſennus, who has particularly deſcribed this inſtrument, mentions ſome peculiar properties of it, e. gr. that the ſound of it is ſtrong enough to drown 20 robuſt voices, being animated merely by the breath of a boy, and yet the ſound of it may be attempered to the ſoftneſs of the ſweeteſt voice. Another peculiarity of this inſtrument is, that great as the diſtance between the third and fourth hole appears, yet whether the third hole be open or ſhut, the difference is but a tone.

SERPENT, in *Mythology*, was a very common ſymbol of the ſun, and he is repreſented biting his tail, and with his body formed into a circle, in order to indicate the ordinary courſe of this luminary, and under this form it was an emblem of time and eternity. The ſerpent was alſo the ſymbol of medicine, and of the gods which preſided over it, as of Apollo and Æſculapius: and this animal was the object of very ancient and general worſhip, under various appellations and characters. In moſt of the ancient rites we find ſome alluſion to the ſerpent, under the ſeveral titles of Ob, Ops, Python, &c. This idolatry is alluded to by Moſes, (Lev. xx. 27.). The woman at Endor who had a familiar ſpirit is called Oub, or Ob, and it is interpreted Pythoniſſa. The place where ſhe reſided, ſays the learned Mr Bryant, ſeems to have been named from the worſhip then inſtituted; for Endor is compounded of *En-ador*, and ſignifies *fons Pythonis*, "the fountain of light, the oracle of the god Ador, which oracle was probably founded by the Canaanites, and had never been totally ſuppreſſed. His pillar was alſo called *Abbadir*, or *Abadir*, compounded of *ab* and *adir*, and meaning the ſerpent deity Addir, the ſame as Adorus. Serpent.

In the orgies of Bacchus, the perſons who partook of the ceremony uſed to carry ſerpents in their hands, and with horrid ſcreams call upon Eva! Eva! Eva, being, according to the writer juſt mentioned, the ſame as epha, or opha, which the Greeks rendered *ophis*, and by it denoted a ſerpent. Theſe ceremonies and this ſymbolic worſhip began among the Magi, who were the ſons of Chus; and by them they were propagated in various parts. Wherever the Amonians founded any places of worſhip, and introduced their rites, there was generally ſome ſtory of a ſerpent. There was a legend about a ſerpent at Colchis, at Thebes, and at Delphi; and likewiſe in other places. The Greeks called Apollo himſelf Python, which is the ſame as Opis, Oupis, and Oub.

In Egypt there was a ſerpent named Thermuthis, which was looked upon as very ſacred; and the natives are ſaid to have made uſe of it as a royal tiara, with which they ornamented the ſtatues of Iſis. The kings of Egypt wore high bonnets, terminating in a round ball, and ſurrounded with figures of aſps; and the prieſts likewiſe had the repreſentation of ſerpents upon their bonnets.

Abadon, or Abaddon, mentioned in the Revelations xx. 2. is ſuppoſed by Mr Bryant to have been the name of the Ophite god, with whoſe worſhip the world had been ſo long infected. This worſhip began among the people of Chaldea, who built the city of Ophis upon the Tigris, and were greatly addicted to divination, and to the worſhip of the ſerpent. From Chaldea the worſhip paſſed into Egypt, where the ſerpent deity was called Canoph, Can-eph, and C'neph. It had alſo the name of Ob or Oub, and was the ſame as the Baſiliſcus or royal ſerpent, the ſame as the Thermuthis, and made uſe of by way of ornament to the ſtatues of their gods. The chief deity of Egypt is ſaid to have been Vulcan, who was ſtyled Opas. He was the ſame as Oſiris, the Sun, and hence was often called Ob-el, or Pytho-ſol, and there were pillars ſacred to him, with curious hieroglyphical inſcriptions bearing the ſame name; whence among the Greeks, who copied from the Egyptians, every thing gradually tapering to a point was ſtyled obelos, or obeliſcus.

As the worſhip of the ſerpent began among the ſons of Chus, Mr Bryant conjectures, that from thence they were denominated Ethiopians and Aithiopians, from Ath-ope or Ath-opes, the god whom they worſhipped, and not from their complexion: the Ethiopes brought theſe rites into Greece, and called the iſland where they firſt eſtabliſhed them, *Ellopia*, *Solis Serpentis inſula*, the ſame with *Eubœa*, or *Oubaia*, i. e. "the ſerpent iſland."

The ſame learned writer diſcovers traces of the ſerpent worſhip among the Hyperboreans, at Rhodes, named Ophiuſa, in Phrygia, and upon the Helleſpont, in the iſland Cyprus, in Crete, among the Athenians, in the name of Cecrops, among the natives of Thebes in Bœotia, among the Lacedemonians, in Italy, in Syria, &c. and in the names of many places, as well as of the people where the Ophites ſettled. One of the moſt early hereſies introduced into the Chriſtian church was that of the Ophitæ. Bryant's Analyſis of Ancient Mythology, vol. i. p. 43, &c. p. 473, &c.

SERPENT Stones. See *CORNU Ammonis*, and *SNAKE-Stones.*

Sea-SERPENT. See *SEA Serpent.*

SERPENTARIA, SNAKE-ROOT; a ſpecies of ARISTOLOCHIA. See BOTANY and MATERIA MEDICA *Index.*

SERPENTARIUS, in *Aſtronomy*, a conſtellation of the northern hemiſphere, called alſo Ophiuchus, and anciently Æſculapius. The ſtars in the conſtellation Serpentarius, in Ptolemy's catalogue, are 29; in Tycho's 15; in Hevelius's 40; in the Britannic catalogue they are 74.

SERPENTINE, in general, denotes any thing that reſembles a ſerpent; hence the worm or pipe of a ſtill, twiſted in a ſpiral manner, is termed a *ſerpentine worm.*

SERPENTINE Stone, a ſpecies of mineral belonging to the magneſian genus. See MINERALOGY *Index.*

SERPENTINE *verſes*, are ſuch as begin and end with the ſame word. As,

Ambo florentes ætatibus, Arcades ambo.

SERPENTINE, in the *Manege*. A horſe is ſaid to have a ſerpentine tongue, if it is always friſking and moving, and ſometimes paſſing over the bit, inſtead of keeping in the void ſpace, called the liberty of the tongue.

SERPICULA, a genus of plants belonging to the claſs monœcia. See BOTANY *Index.*

SERPIGO, in *Surgery*, a kind of herpes, popularly called a *tetter* or ringworm. See SURGERY.

SERPULA, a genus belonging to the claſs of vermes and to the order of teſtacea. See CONCHOLOGY *Index.*

SERRANUS, JOANNES, or John de Serres, a learned French Proteſtant, was born about the middle of the 16th century. He acquired the Greek and Latin languages at Lauſanne, and devoted himſelf to the ſtudy of the philoſophy of Ariſtotle and Plato. On his return to France he ſtudied divinity. He began to diſtinguiſh himſelf in 1572 by his writings, but was obliged to forſake his country after the dreadful maſſacre of St Bartholomew. He became miniſter of Niſmes in 1582, but was never regarded as a very zealous Calviniſt: he has even been ſuſpected, though without reaſon, of having actually abjured the Proteſtant religion. He was one of the four clergymen whom Henry IV. conſulted about the Romiſh religion, and who returned for anſwer, *that Catholics might be ſaved.* He wrote afterwards a treatiſe in order to reconcile the two communions, entitled *De fide Catholica, ſive de principiis religionis Chriſtianæ, communi omnium Chriſtianorum conſenſu, ſemper et ubique ratis.* This work was diſliked by the Catholics, and received with ſuch indignation by the Calviniſts of Geneva, that many writers have affirmed that they poiſoned the author. It is certain at leaſt that he died at Geneva in 1598, at the age of 50. His principal works are, 1. A Latin tranſlation of Plato, publiſhed by Henry Stephens, which owes much of its reputation to the elegance of the Greek copy which accompanies it. 2. A Treatiſe on the Immortality of the Soul. 3. *De ſtatu religionis et reipublicæ in Francia.* 4. *Memoire de la 3me guerre civile et derniers troubles de France ſous Charles IX. &c.* 5. *Inventaire general de l'Hiſtoire de France, illuſtré par la conference de l'Egliſe et de l'Empire, &c.* 6. *Recueil de choſe memorable avenue en France ſous Henri II. François II. Charles IX. Henri III.* Theſe three hiſtorical treatiſes have been juſtly accuſed of partiality and paſſion; faults which it is next to impoſſible for a contemporary writer to avoid, eſpecially if he bore any part in the tranſactions which he deſcribes. His ſtyle is exceedingly incorrect and inelegant; his miſtakes too and miſtatements of facts are very numerous.

SERRATED, in general, ſomething indented or notched in the manner of a ſaw; a term much uſed in the deſcription of the leaves of plants. See BOTANY *Index.*

SERRATULA, SAW-WORT, a genus of plants belonging to the ſyngeneſia claſs, and in the natural ſyſtem ranged under the 49th order, *Compoſitæ.* See BOTANY *Index.*

SERRATUS, in *Anatomy*, a name given to ſeveral muſcles, from their reſemblance to a ſaw. See ANATOMY, *Table of the Muſcles.*

SERRISHTEHDAR, in Bengal, keeper of records or accounts.

SERTORIUS, QUINTUS, an eminent Roman general; (ſee SPAIN), under the hiſtory of which his exploits are related.

SERTULARIA, a genus belonging to the claſs of vermes, and to the order of zoophyta. See HELMINTHOLOGY *Index.*

SERVAL, MOUNTAIN CAT. See FELIS, MAMMALIA *Index.*

SERVANDONI, JOHN NICOLAS, a celebrated architect, was born at Florence in 1695. He rendered himſelf famous by his exquiſite taſte in architecture, and by his genius for decorations, fetes, and building. He was employed and rewarded by moſt of the princes in Europe. He was honoured in Portugal with the order of Chriſt: In France he was architect and painter to the king, and member of the different academies eſtabliſhed for the advancement of theſe arts. He received the ſame titles from the kings of Britain, Spain, Poland, and from the duke of Wirtemberg. Notwithſtanding theſe advantages, his want of economy was ſo great, that he left nothing behind him. He died at Paris in 1766. Paris is indebted to him for many of its ornaments. He made decorations for the theatres of London and Dreſden. The French king's theatre, called *la ſalle des Machines*, was under his management for ſome time. He was permitted to exhibit ſome ſhows conſiſting of ſimple decorations: Some of theſe were aſtoniſhingly ſublime; his "Deſcent of Æneas into Hell" in particular, and his "Enchanted Foreſt," are well known. He built and embelliſhed a theatre at Chambor for Mareſchal Saxe; and furniſhed the plan and the model of the theatre royal at Dreſden. His genius for fetes was remarkable; he had the management of a great number in Paris, and even in London. He conducted

one

Servandoni, Servant.

one at Liſbon given an account of a victory gained by the duke of Cumberland. He was employed frequently by the king of Portugal, to whom he preſented ſeveral elegant plans and models. The prince of Wales, too, father to the preſent king, engaged him in his ſervice; but the death of that prince prevented the execution of the deſigns which had been projected. He preſided at the magnificent *fete* given at Vienna on account of the marriage of the archduke Joſeph and the Infanta of Parma. But it would be endleſs to attempt an enumeration of all his performances and exhibitions.

SERVANT, a term of relation, ſignifying a perſon who owes and pays obedience for a certain time to another in quality of a maſter.

As to the ſeveral ſorts of ſervants: It was obſerved, under the article LIBERTY, that pure and proper ſlavery does not, nay cannot, ſubſiſt in Britain: ſuch we mean whereby an abſolute and unlimited power is given to the maſter over the life and fortune of the ſlave. And indeed it is repugnant to reaſon, and the principles of natural law, that ſuch a ſtate ſhould ſubſiſt anywhere. See SLAVERY.

The law of England therefore abhors, and will not endure, the exiſtence of ſlavery within this nation: ſo that when an attempt was made to introduce it, by ſtatute 1 Edw. VI. c. 3. which ordained, that all idle vagabonds ſhould be made ſlaves, and fed upon bread, water, or ſmall drink, and refuſe-meat; ſhould wear a ring of iron round their necks, arms, or legs; and ſhould be compelled, by beating, chaining, or otherwiſe, to perform the work aſſigned them, were it ever ſo vile; the ſpirit of the nation could not brook this condition, even in the moſt abandoned rogues; and therefore this ſtatute was repealed in two years afterwards. And now it is laid down, that a ſlave or negro, the inſtant he lands in Britain, becomes a freeman; that is, the law will protect him in the enjoyment of his perſon and his property. Yet, with regard to any right which the maſter may have lawfully acquired to the perpetual ſervice of John or Thomas, this will remain exactly in the ſame ſtate as before: for this is no more than the ſame ſtate of ſubjection for life which every apprentice ſubmits to for the ſpace of ſeven years, or ſometimes for a longer term. Hence, too, it follows, that the infamous and unchriſtian practice of withholding baptiſm from negro-ſervants, leſt they ſhould thereby gain their liberty, is totally without foundation, as well as without excuſe. The law of England acts upon general and extenſive principles: it gives liberty, rightly underſtood, that is, protection, to a Jew, a Turk, or a Heathen, as well as to thoſe who profeſs the true religion of Chriſt; and it will not diſſolve a civil obligation between maſter and ſervant, on account of the alteration of faith in either of the parties; but the ſlave is entitled to the ſame protection in England before as after baptiſm; and, whatever ſervice the Heathen negro owed of right to his American maſter, by general, not by local law, the ſame (whatever it be) is he bound to render when brought to England and made a Chriſtian.

1. The firſt ſort of ſervants, therefore, acknowledged by the laws of England, are *menial ſervants*; ſo called from being *intra mœnia*, or domeſtics. The contract between them and their maſters ariſes upon the hiring. If the hiring be general, without any particular time limited, the law conſtrues it to be a hiring for a year; upon a principle of natural equity, that the ſervant ſhall ſerve and the maſter maintain him, throughout all the revolutions of the reſpective ſeaſons; as well when there is work to be done, as when there is not: but the contract may be made for any larger or ſmaller term. All ſingle men between 12 years old and 60, and married ones under 30 years of age, and all ſingle women between 12 and 40, not having any viſible livelihood, are compellable by two juſtices to go out to ſervice in huſbandry or certain ſpecific trades, for the promotion of honeſt induſtry; and no maſter can put away his ſervant, or ſervant leave his maſter, after being ſo retained, either before or at the end of his term, without a quarter's warning; unleſs upon reaſonable cauſe, to be allowed by a juſtice of the peace: but they may part by conſent, or make a ſpecial bargain. Servant.

2. Another ſpecies of ſervants are called *apprentices*, (from *apprendre*, to learn); and are uſually bound for a term of years, by deed indented or indentures, to ſerve their maſters, and be maintained and inſtructed by them. This is uſually done to perſons of trade, in order to learn their art and myſtery; and ſometimes very large ſums are given with them as a premium for ſuch their inſtruction: but it may be done to huſbandmen, nay, to gentlemen and others. And children of poor perſons may be apprenticed out by the overſeers, with conſent of two juſtices, till 24 years of age, to ſuch perſons as are thought fitting; who are alſo compellable to take them: and it is held, that gentlemen of fortune, and clergymen, are equally liable with others to ſuch compulſion: for which purpoſes our ſtatutes have made the indentures obligatory, even though ſuch pariſh-apprentice be a minor. Apprentices to trades may be diſcharged on reaſonable cauſe, either at the requeſt of themſelves or maſters, at the quarter-ſeſſions, or by one juſtice, with appeal to the ſeſſions; who may, by the equity of the ſtatute, if they think it reaſonable, direct reſtitution of a rateable ſhare of the money given with the apprentice: and pariſh-apprentices may be diſcharged in the ſame manner by two juſtices. But if an apprentice, with whom leſs than 10 pounds hath been given, runs away from his maſter, he is compellable to ſerve out his time of abſence, or make ſatisfaction for the ſame, at any time within ſeven years after the expiration of his original contract. See APPRENTICE and APPRENTICESHIP.

3. A third ſpecies of ſervants are *labourers*, who are only hired by the day or the week, and do not live *intra mœnia*, as part of the family; concerning whom the ſtatutes before cited have made many very good regulations; 1. Directing that all perſons who have no viſible effects may be compelled to work; 2. Defining how long they muſt continue at work in ſummer and in winter: 3. Puniſhing ſuch as leave or deſert their work: 4. Empowering the juſtices at ſeſſions, or the ſheriff of the county, to ſettle their wages: and, 5. Inflicting penalties on ſuch as either give or exact more wages than are ſo ſettled.

4. There is yet a fourth ſpecies of ſervants, if they may be ſo called, being rather in a ſuperior, a miniſterial, capacity; ſuch as *ſtewards*, *factors*, and *bailiffs*; whom, however, the law conſiders as ſervants *pro tempore*, with regard to ſuch of their acts as affect their maſter's or employer's property.

As

Servant || Servetus.

As to the manner in which this relation affects the maſter, the ſervant himſelf, or third parties, ſee the article *MASTER and Servant*.

For the condition of ſervants by the law of Scotland, ſee LAW.

SERVETISTS, a name given to the modern Antitrinitarians, from their being ſuppoſed to be the followers of Michael Servetus; who, in the year 1553, was burnt at Geneva, together with his books.

SERVETUS, MICHAEL, a learned Spaniſh phyſician, was born at Villaneuva, in Arragon, in 1509. He was ſent to the univerſity of Toulouſe to ſtudy the civil law. The Reformation, which had awakened the moſt poliſhed nations of Europe, directed the attention of thinking men to the errors of the Romiſh church and to the ſtudy of the Scriptures. Among the reſt Servetus applied to this ſtudy. From the love of novelty, or the love of truth, he carried his inquiries far beyond the other reformers, and not only renounced the falſe opinions of the Roman Catholics, but went ſo far as to queſtion the doctrine of the Trinity. Accordingly, after ſpending two or three years at Toulouſe, he determined to go into Germany to propagate his new opinions, where he could do it with moſt ſafety. At Baſil he had ſome conferences with Oecolampadius. He went next to Straſburg to viſit Bucer and Capito, two eminent reformers of that town. From Straſburg he went to Hugenau, where he printed a book, intitled *De Trinitatis Erroribus*, in 1531. The enſuing year he publiſhed two other treatiſes on the ſame ſubject: in an advertiſement to which, he informs the reader that it was not his intention to retract any of his former ſentiments, but only to ſtate them in a more diſtinct and accurate manner. To theſe two publications he had the courage to put his name, not ſuſpecting that in age when liberty of opinion was granted, the exerciſe of that liberty would be attended with danger. After publiſhing theſe books, he left Germany, probably finding his doctrines not ſo cordially received as he expected. He went firſt to Baſil, and thence to Lyons, where he lived two or three years. He then removed to Paris, where he ſtudied medicine under Sylvius, Fernelius, and other profeſſors, and obtained the degree of maſter of arts and doctor of medicine. His love of controverſy involved him in a ſerious diſpute with the phyſicians of Paris; and he wrote an Apology, which was ſuppreſſed by an edict of the Parliament. The miſunderſtanding which this diſpute produced with his colleagues, and the chagrin which ſo unfavourable a termination occaſioned, made him leave Paris in diſguſt. He ſettled two or three years in Lyons, and engaged with the Frellons, eminent printers of that age, as a corrector to their preſs. At Lyons he met with Pierre Palmier, the archbiſhop of Vienne, with whom he had been acquainted at Paris. That prelate, who was a great encourager of learned men, preſſed him to accompany him to Vienne, offering him at the ſame time an apartment in his palace. Servetus accepted the offer, and might have lived a tranquil and happy life at Vienne, if he could have confined his attention to medicine and literature. But the love of controverſy, and an eagerneſs to eſtabliſh his opinions, always poſſeſſed him. At this time Calvin was at the head of the reformed church at Geneva. With Servetus he had been acquainted at Paris, and had there oppoſed his opinions. For 16 years Calvin kept up a correſpondence with him, endeavouring to reclaim him from his errors. Servetus had read the works of Calvin, but did not think they merited the high eulogies of the reformers, nor were they ſufficient to convince him of his errors. He continued, however, to conſult him; and for this purpoſe ſent from Lyons to Geneva three queſtions, which reſpected the divinity of Jeſus Chriſt, regeneration, and the neceſſity of baptiſm. To theſe Calvin returned a civil anſwer. Servetus treated the anſwer with contempt, and Calvin replied with warmth. From reaſoning he had recourſe to abuſive language; and this produced a polemical hatred, the moſt implacable diſpoſition in the world. Calvin having obtained ſome of Servetus's papers, by means, it is ſaid, not very honourable, ſent them to Vienne along with the private letters which he had received in the courſe of their correſpondence. The conſequence was, that Servetus was arreſted; but having eſcaped from priſon, he reſolved to retire to Naples, where he hoped to practiſe medicine with the ſame reputation which he had ſo long enjoyed at Vienne. He imprudently took his route through Geneva, though he could not but know that Calvin was his mortal enemy. Calvin informed the magiſtrates of his arrival; Servetus was apprehended, and appointed to ſtand trial for hereſy and blaſphemy. It was a law at Geneva, that every accuſer ſhould ſurrender himſelf a priſoner, that if the charge ſhould be found falſe, the accuſer ſhould ſuffer the puniſhment in which he meant to involve the accuſed. Calvin not chooſing to go to priſon himſelf, ſent one of his domeſtics to preſent the impeachment againſt Servetus. The articles brought againſt him were collected from his writings with great care; an employment which took up three days. One of theſe articles was, "that Servetus had denied that Judæa was a beautiful, rich, and fertile country; and affirmed, on the authority of travellers, that it was poor, barren, and diſagreeable." He was alſo charged with "corrupting the Latin Bible, which he was employed to correct at Lyons, by introducing impertinent, trifling, whimſical, and impious notes of his own through every page." But the main article, which was certainly fatal to him, was, "that in the perſon of Mr Calvin, miniſter of the word of God in the church of Geneva, he had defamed the doctrine that is preached, uttering all imaginable injurious, blaſphemous words againſt it."

Servetus.

Calvin viſited Servetus in priſon, and had frequent conferences with him: but finding that, in oppoſition to all the arguments he could employ, the priſoner remained inflexible in his opinions, he left him to his fate. Before ſentence was paſſed, the magiſtrates of Geneva conſulted the miniſters of Bale, of Bern, and Zurich; and, as another account informs us, the magiſtrates of the Proteſtant Cantons of Switzerland. And to enable them to form a judgment of the criminality of Servetus, they tranſmitted the writings of Calvin, with his anſwers. The general opinion was, that Servetus ought to be condemned to death for blaſphemy. He was accordingly ſentenced to be burnt alive on the 27th of October 1553. As he continued alive in the midſt of the flames more than two hours, it is ſaid, finding his torment thus protracted, he exclaimed, "Unhappy wretch that I am! Will the flames be inſufficient to terminate my miſery! What then! Will the hundred pieces of gold, and the rich collar which they took from me,

Servetus, Service.

me, not purchaſe wood enough to conſume me more quickly!" "Though the ſentence of death was paſſed againſt Servetus by the magiſtrates of Geneva, with the approbation of a great number of the magiſtrates and miniſters of Switzerland, yet it is the opinion of moſt hiſtorians that this dreadful ſentence was impoſed at the inſtigation of Calvin. This act of ſeverity for holding a ſpeculative opinion, however erroneous and abſurd, has left a ſtain on the character of this illuſtrious reformer, which will attend the name of Calvin as long as hiſtory ſhall preſerve it from oblivion. The addreſs and art which he uſed in apprehending Servetus, his inhumanity to him during his trial, his diſſimulation and malevolence after his condemnation, prove that he was as much influenced by perſonal hatred as by a deſire to ſupport the intereſt of religion, though probably, during the trial, Calvin believed he was performing a very pious action. This intolerant ſpirit of Calvin and the magiſtrates of Geneva gave the Roman Catholics a favourable opportunity to accuſe the Proteſtants of inconſiſtency in their principles, which they did not fail to embrace. "How could the magiſtrates (ſays the author of the *Dictionnaire des Hereſies*), who acknowledged no infallible interpretation of the Scriptures, condemn Servetus to death becauſe he explained them differently from Calvin; ſince every man has the privilege to expound the Scripture, according to his own judgment, without having recourſe to the church? It is a great injuſtice to condemn a man becauſe he will not ſubmit to the judgment of an enthuſiaſt, who may be wrong as well as himſelf."

Servetus was a man of great acuteneſs and learning, and well verſed in the arts and ſciences. In his own profeſſion his genius exerted itſelf with ſucceſs. In his tract intitled *Chriſtianiſmi Reſtitutio*, publiſhed in 1553, he remarks, that the whole maſs of blood paſſes through the lungs by the pulmonary artery and vein, in oppoſition to the opinion which was then univerſally entertained, that the blood paſſes through the partition which divides the two ventricles. This was an important ſtep towards the diſcovery of the circulation of the blood.

His works conſiſt of Controverſial Writings concerning the Trinity; an edition of Pagninus's Verſion of the Bible, with a preface and notes, publiſhed under the name of Michael Villanevanus; an Apology to the Phyſicians of Paris; and a book intitled *Ratio Syruporum*. Moſheim has written in Latin a Hiſtory of the Hereſy and Misfortunes of Servetus, which was publiſhed at Helmſtadt, in 4to, in 1728. From the curious details which it gives it is extremely intereſting.

SERVIA, a province of Turkey in Europe, bounded on the north by the rivers Danube and Save, which ſeparate it from Hungary; on the eaſt, by Bulgaria; on the weſt, by Boſnia: and on the ſouth, by Albania and Macedonia. It is about 190 miles in length from eaſt to weſt; 95 in breadth from north to ſouth; and is divided into four ſangiacates. Two of theſe were ceded to the Chriſtians in 1718, who united them into one. This continued till 1739, when the Turks were victorious; and then they were abandoned to the Turks by the treaty of Belgrade. Belgrade is the capital town.

SERVICE, in *Law*, is a duty which a tenant, on account of his fee, owes to his lord.

Service.

There are many diviſions of ſervices; as, 1. Into perſonal, where ſomething is to be done by the tenant in perſon, as homage and fealty. 2. Real, ſuch as wards, marriages, &c. 3. Accidental, including heriots, reliefs, and the like. 4. Entire, where, on the alienation of any part of the lands by a tenant, the ſervices become multiplied. 5. Frank-ſervice, which was performed by freemen, who were not obliged to perform any baſe ſervice, but only to find a man and horſe to attend the lord into the army or to court. 6. Knight's ſervice, by which lands were anciently held of the king, on paying homage, ſervice in war, &c.

As in every free and well regulated ſociety there muſt be a diverſity of ranks, there muſt be a great number of perſons employed in ſervice, both in agriculture and domeſtic affairs. In this country, ſervice is a contract into which the ſervant voluntarily enters; and the maſter's authority extends no farther than to the performance of that ſpecies of labour for which the agreement was made.

"The treatment of ſervants (ſays that reſpectable moraliſt Mr Paley), as to diet, diſcipline, and accommodation, the kind and quantity of work to be required of them, the intermiſſion, liberty, and indulgence to be allowed them, muſt be determined in a great meaſure by cuſtom; for where the contract involves ſo many particulars, the contracting parties expreſs a few perhaps of the principal, and by mutual underſtanding refer the reſt to the known cuſtom of the country in like caſes. *Paley's Moral and Political Philoſophy*, p. 139.

"A ſervant is not bound to obey the unlawful commands of his maſter; to miniſter, for inſtance, to his unlawful pleaſures; or to aſſiſt him in unlawful practices in his profeſſion; as in ſmuggling or adulterating the articles which he deals in. For the ſervant is bound by nothing but his own promiſe; and the obligation of a promiſe extends not to things unlawful.

"For the ſame reaſon, the maſter's authority does not juſtify the ſervant in doing wrong; for the ſervant's own promiſe, upon which that authority is founded, would be none.

"Clerks and apprentices ought to be employed entirely in the profeſſion or trade which they are intended to learn. Inſtruction is their wages; and to deprive them of the opportunities of inſtruction, by taking up their time with occupations foreign to their buſineſs, is to defraud them of their wages.

"The maſter is reſponſible for what a ſervant does in the ordinary courſe of his employment; for it is done under a general authority committed to him, which is in juſtice equivalent to a ſpecific direction. Thus, if I pay money to a banker's clerk, the banker is accountable: but not if I had paid it to his butler or his footman, whoſe buſineſs it is not to receive money. Upon the ſame principle, if I once ſend a ſervant to take up goods upon credit, whatever goods he afterwards takes up at the ſame ſhop, ſo long as he continues in my ſervice, are juſtly chargeable to my account.

"The law of this country goes great lengths in intending a kind of concurrence in the maſter, ſo as to charge him with the conſequences of his ſervants conduct. If an innkeeper's ſervant rob his gueſts, the innkeeper muſt make reſtitution; if a farrier's ſervant lame your horſe, the farrier muſt anſwer for the damage;

Service. mage; and ſtill farther, if your coachman or carter drive over a paſſenger in the road, the paſſenger may recover from you a ſatisfaction for the hurt he ſuffers. But theſe determinations ſtand, I think, rather upon the authority of the law, than any principle of natural juſtice."

There is a grievance which has long and juſtly been complained of, the giving of good characters to bad ſervants. This is perhaps owing to careleſſneſs, to a deſire of getting rid of a bad ſervant, or to miſtaken compaſſion. But ſuch careleſſneſs is inexcuſable. When a man gives his ſanction to the character of a bad ſervant, he ought to reflect on the nature and conſequences of what he is doing. He is giving his name to a falſehood; he is deceiving the honeſt man who confides in his veracity; and he is deliberately giving a knave an opportunity of cheating an honeſt man. To endeavour to get quit of a bad ſervant in this way, is ſurely not leſs criminal than concealing the faults and diſadvantages of an eſtate which is advertiſed for ſale, and aſcribing to it advantages which it does not poſſeſs. In this caſe, we know the ſale would be reduced, and the advertiſer diſgraced. Many maſters give characters to ſervants out of compaſſion; but it is to this miſtaken compaſſion that the diſorderly behaviour of ſervants is perhaps principally owing: for if the puniſhment of diſhoneſty be only a change of place (which may be a reward inſtead of a puniſhment), it ceaſes to be a ſervant's intereſt to be true to his truſt.

We have ſaid above that a maſter's authority over his ſervant extends no farther than the terms of contract; by which we meant, that a maſter could give no unreaſonable orders to his ſervant, or ſuch as was inconſiſtent with the terms of contract. But the relation between a maſter and ſervant is certainly cloſer than the mere terms of a contract: it is a moral as well as a legal relation. A maſter of a family ought to ſuperintend the morals of his ſervants, and to reſtrain them from vices. This he may do by his example, by his influence, and authority. Indeed every man poſſeſſed of authority is guilty of criminal negligence if he does not exert his authority for promoting virtue in his inferiors; and no authority is ſo well adapted for this purpoſe as that of maſters of families, becauſe none operates with an influence ſo immediate and conſtant. It is wonderful how much good a nobleman or gentleman of fortune can do to his domeſtics by attending to their morals; and every maſter may be a bleſſing to individuals and to ſociety, by exerting prudently that influence which his ſituation gives him over the conduct of his ſervant.

Choral SERVICE, in church-hiſtory, denotes that part of religious worſhip which conſiſts in chanting and ſinging. The advocates for the high antiquity of ſinging, as a part of church-muſic, urge the authority of St Paul in its favour (Epheſ. chap. v. ver. 19. and Coloſ. chap. iii. ver. 16.). On the authority of which paſſages it is aſſerted, that ſongs and hymns were, from the eſtabliſhment of the church, ſung in the aſſemblies of the faithful; and it appears from undoubted teſtimony, that ſinging, which was practiſed as a ſacred rite among the Egyptians and Hebrews, at a very early period, and which likewiſe conſtituted a conſiderable part of the religious ceremonies of the Greeks and Romans, made a part of the religious worſhip of Chriſtians, not only before churches were built, and their religion eſtabliſhed by law, but from the firſt profeſſion of Chriſtianity. However, the era from whence others have dated the introduction of muſic into the ſervice of the church, is that period during which Leontius governed the church of Antioch, *i. e.* between the year of Chriſt 347 and 356. See ANTIPHONY. Service.

From Antioch the practice ſoon ſpread through the other churches of the Eaſt; and in a few ages after its firſt introduction into divine ſervice, it not only received the ſanction of public authority, but thoſe were forbid to join in it who were ignorant of muſic. A canon to this purpoſe was made by the council of Laodicea, which was held about the year 372; and Zonanas informs us, that theſe canonical ſingers were reckoned a part of the clergy. Singing was introduced into the weſtern churches by St Ambroſe about the year 374, who was the inſtitutor of the Ambroſian chant eſtabliſhed at Milan about the year 386; and Euſebius (lib. ii. cap. 17.) tells us, that a regular choir, and method of ſinging the ſervice, were firſt eſtabliſhed, and hymns uſed, in the church at Antioch, during the reign of Conſtantine, and that St Ambroſe, who had long reſided there, had his melodies thence. This was about 230 years afterwards amended by Pope Gregory the Great, who eſtabliſhed the Gregorian chant; a plain, uniſonous kind of melody, which he thought conſiſtent with the gravity and dignity of the ſervice to which it was to be applied. This prevails in the Roman church even at this day: it is known in Italy by the name of *canto fermo;* in France by that of *plain chant;* and in Germany and moſt other countries by that of the *cantus Gregorianus*. Although no ſatisfactory account has been given of the ſpecific difference between the Ambroſian and Gregorian chants, yet all writers on this ſubject agree in ſaying, that St Ambroſe only uſed the four authentic modes, and that the four plagal were afterwards added by St Gregory. Each of theſe had the ſame final, or key-note, as its relative authentic; from which there is no other difference, than that the melodies in the four authentic or principal modes are generally confined within the compaſs of the eight notes above the key-note, and thoſe in the four plagal or relative modes, within the compaſs of eight notes below the fifth of the key. See MODE

Eccleſiaſtical writers ſeem unanimous in allowing that Pope Gregory, who began his pontificate in 590, collected the muſical fragments of ſuch ancient pſalms and hymns as the firſt fathers of the church had approved and recommended to the firſt Chriſtians; and that he ſelected, methodized, and arranged them in the order which was long continued at Rome, and ſoon adopted by the chief part of the weſtern church. Gregory is alſo ſaid to have baniſhed from the church the *canto figurato*, as too light and diſſolute; and it is added, that his own chant was called *canto fermo*, from its gravity and ſimplicity.

It has been long a received opinion, that the eccleſiaſtical tones were taken from the reformed modes of Ptolemy; but Dr Burney obſerves, that it is difficult to diſcover any connection between them, except in their names; for their number, upon examination, is not the ſame: thoſe of Ptolemy being ſeven, the eccleſiaſtical eight; and indeed the Greek names given to the

Service. the eccleſiaſtical modes do not agree with thoſe of Ptolemy in the ſingle inſtance of key, but with thoſe of higher antiquity. From the time of Gregory to that of Guido, there was no other diſtinction of keys than that of authentic and plagal; nor were any ſemitones uſed but thoſe from E to F, B to C, and occaſionally A to B *b*.

With reſpect to the muſic of the primitive church, it may be obſerved, that though it conſiſted in the ſinging of pſalms and hymns, yet it was performed in many different ways; ſometimes the pſalms were ſung by one perſon alone, whilſt the reſt attended in ſilence; ſometimes they were ſung by the whole aſſembly; ſometimes alternately, the congregation being divided into ſeparate choirs; and ſometimes by one perſon, who repeated the firſt part of the verſe, the reſt joining in the cloſe of it. Of the four different methods of ſinging now recited, the ſecond and third were properly diſtinguiſhed by the names of *ſymphony* and *antiphony*; and the latter was ſometimes called *reſponſaria*, in which women were allowed to join. St Ignatius, who, according to Socrates (lib. vi. cap. 8.), converſed with the apoſtles, is generally ſuppoſed to have been the firſt who ſuggeſted to the primitive Chriſtians in the Eaſt the method of ſinging hymns and pſalms alternately, or in dialogues; and the cuſtom ſoon prevailed in every place where Chriſtianity was eſtabliſhed; though Theodoret in his hiſtory (lib. ii. cap. 24.) tells us, that this manner of ſinging was firſt practiſed at Antioch. It likewiſe appears, that almoſt from the time when muſic was firſt introduced into the ſervice of the church, it was of two kinds, and conſiſted in a gentle inflection of the voice, which they termed plain ſong, and a more elaborate and artificial kind of muſic, adapted to the hymns and ſolemn offices contained in its ritual; and this diſtinction has been maintained even to the preſent day.

Although we find a very early diſtinction made between the manner of ſinging the hymns and chanting the pſalms, it is, however, the opinion of the learned Martini, that the muſic of the firſt five or ſix ages of the church conſiſted chiefly in a plain and ſimple chant of uniſons and octaves, of which many fragments are ſtill remaining in the *canto fermo* of the Romiſh miſſals. For with reſpect to muſic in parts, as it does not appear, in theſe early ages, that either the Greeks or Romans were in poſſeſſion of harmony or counterpoint, which has been generally aſcribed to Guido, a monk of Arezzo in Tuſcany, about the year 1022, though others have traced the origin of it to the eighth century, it is in vain to ſeek it in the church. The choral muſic, which had its riſe in the church of Antioch, and from thence ſpread through Greece, Italy, France, Spain, and Germany, was brought into Britain by the ſingers who accompanied Auſtin the monk, when he came over, in the year 596, charged with a commiſſion to convert the inhabitants of this country to Chriſtianity. Bede tells us, that when Auſtin and the companions of his miſſion had their firſt audience of King Ethelbert, in the iſle of Thanet, they approached him in proceſſion, ſinging litanies; and that afterwards, when they entered the city of Canterbury, they ſung a litany, and at the end of it Allelujah. But though this was the firſt time the Anglo-Saxons had heard the Gregorian chant, yet Bede likewiſe tells us, that our Britiſh anceſtors had been inſtructed in the rites and ceremonies of the Gallican church by St Germanus, and heard him ſing Allelujah many years before the arrival of St Auſtin. In 680, John, præcentor of St Peter's in Rome, was ſent over by Pope Agatho to inſtruct the monks of Weremouth in the art of ſinging; and he was prevailed upon to open ſchools for teaching muſic in other places in Northumberland. Benedict Biſcop, the preceptor of Bede, Adrian the monk, and many others, contributed to diſſeminate the knowledge of the Roman chant. At length the ſucceſſors of St Gregory, and of Auſtin his miſſionary, having eſtabliſhed a ſchool for eccleſiaſtical muſic at Canterbury, the reſt of the iſland was furniſhed with maſters from that ſeminary. The choral ſervice was firſt introduced in the cathedral church of Canterbury; and till the arrival of Theodore, and his ſettlement in that ſee, the practice of it ſeems to have been confined to the churches of Kent; but after that, it ſpread over the whole kingdom; and we meet with records of very ample endowments for the ſupport of this part of public worſhip. This mode of religious worſhip prevailed in all the European churches till the time of the Reformation: the firſt deviation from it is that which followed the Reformation by Luther, who, being himſelf a lover of muſic, formed a liturgy, which was a muſical ſervice, contained in a work entitled *Pſalmodia*, h. e. *Cantica ſacra Veteris Eccleſiæ ſelecta*, printed at Norimberg in 1553, and at Wittemberg in 1561. But Calvin, in his eſtabliſhment of a church at Geneva, reduced the whole of divine ſervice to prayer, preaching, and ſinging; the latter of which he reſtrained. He excluded the offices of the antiphon, hymn, and motet, of the Romiſh ſervice, with that artificial and elaborate muſic to which they were ſung; and adopted only that plain metrical pſalmody, which is now in general uſe among the reformed churches, and in the parochial churches of our own country. For this purpoſe he made uſe of Marot's verſion of the Pſalms, and employed a muſician to ſet them to eaſy tunes only of one part. In 1553, he divided the Pſalms into pauſes or ſmall portions, and appointed them to be ſung in churches. Soon after they were bound up with the Geneva catechiſm; from which time the Catholics, who had been accuſtomed to ſing them, were forbid the uſe of them, under a ſevere penalty. Soon after the Reformation commenced in England, complaints were made by many of the dignified clergy and others of the intricacy and difficulty of the church-muſic of thoſe times: in conſequence of which it was once propoſed, that organs and curious ſinging ſhould be removed from our churches. Latimer, in his dioceſe of Worceſter, went ſtill farther, and iſſued injunctions to the prior and convent of St Mary, forbidding in their ſervice all manner of ſinging. In the reign of Edward VI. a commiſſion was granted to eight biſhops, eight divines, eight civilians, and eight common lawyers, to compile a body of ſuch eccleſiaſtical laws as ſhould in future be obſerved throughout the realm. The reſult of this compilation was a work firſt publiſhed in 1571 by Fox the martyrologiſt, and afterwards in 1640, under the title of *Reformatio Legum Eccleſiaſticarum*. Theſe 32 commiſſioners, inſtead of reprobating church-muſic, merely condemned figurative and operoſe muſic, or that kind of ſinging which abounded with fugues, reſponſive paſſages, and a commixture of various and intricate proportions; which, whether extemporary or written, is by muſicians termed *deſcant*. How- Service.

Service || Servitude.

ever, notwithſtanding the objections againſt choral muſic, and the practice of ſome of the reformed churches, the compilers of the Engliſh liturgy in 1548, and the king himſelf, determined to retain muſical ſervice. Accordingly the ſtatute 2 & 3 Edw. VI. cap. 1. though it contains no formal obligation on the clergy, or others, to uſe or join in either vocal or inſtrumental muſic in the common prayer, does clearly recogniſe the practice of ſinging; and in leſs than two years after the compiling of King Edward's liturgy, a formula was compoſed, which continues, with ſcarce any variation, to be the rule for choral ſervice even at this day. The author of this work was John Marbecke, or Marbeike; and it was printed by Richard Grafton, in 1550 under the title of the Book of Common Prayer, noted. Queen Mary laboured to re-eſtabliſh the Romiſh choral ſervice; but the acceſſion of Elizabeth was followed by the act of uniformity; in conſequence of which, and of the queen's injunctions, the Book of Common Prayer, noted by Marbecke, was conſidered as the general formula of choral ſervice. In 1560, another muſical ſervice, with ſome additions and improvements, was printed by John Day; and in 1565, another collection of offices, with muſical notes. Many objections were urged by Cartwright and other Puritans againſt the form and manner of cathedral ſervice, to which Hooker replied in his Eccleſiaſtical Polity. In 1664, the ſtatutes of Edward VI. and Elizabeth, for uniformity in the Common Prayer, were repealed; and the Directory for Public Worſhip, which allows only of the ſinging of pſalms, eſtabliſhed. But upon the reſtoration of Charles II. choral ſervice was again revived, and has ſince uniformly continued. See on this ſubject Hawkins's Hiſtory of Muſic, vol. i. p. 404. vol. ii. p. 264. vol. iii. p. 58—468, &c. vol. iv. p. 44—347.

SERVICE-Tree. See SORBUS, BOTANY *Index.*

SERVITES, a religious order in the church of Rome, founded about the year 1233, by ſeven Florentine merchants, who, with the approbation of the biſhop of Florence, renounced the world, and lived together in a religious community on Mount Senar, two leagues from that city.

SERVITOR, in the univerſity of Oxford, a ſtudent who attends on another for his maintenance and learning. See SIZAR.

SERVITUDE, the condition of a ſervant, or rather ſlave.

Under the declenſion of the Roman empire, a new kind of ſervitude was introduced, different from that of the ancient Romans: it conſiſted in leaving the lands of ſubjugated nations to the firſt owners, upon condition of certain rents, and ſervile offices, to be paid in acknowledgement. Hence the names of *ſervi cenſiti*, *aſcriptitii*, and *addicti glebæ*; ſome whereof were taxable at the reaſonable diſcretion of the lord; others at a certain rate agreed on; and others were mainmortable, who, having no legitimate children, could not make a will to above the value of five pence, the lord being heir of all the reſt; and others were prohibited marrying, or going to live out of the lordſhip. Moſt of theſe ſervices exiſted lately in France; but they were long ago aboliſhed in England. Such, however, was the original of our tenures, &c. See SLAVE.

SERVITUDE, in *Scots Law.* See LAW, Part III. Sect. ix.

SERVIUS, MAURUS HONORATUS, a celebrated grammarian and critic of antiquity, who flouriſhed about the time of Arcadius and Honorius; now chiefly known by his Commentaries on Virgil. There is alſo extant a piece of Servius upon the feet of verſes and the quantity of ſyllables, called *Centimetrum.* Servius || Seſſion.

SERUM, a thin, tranſparent, ſaltiſh liquor, which makes a conſiderable part of the maſs of blood. See ANATOMY and CHEMISTRY *Index.*

SESAMOIDEA OSSA, certain ſmall bones ſomewhat reſembling the ſeeds of ſeſamum, whence their name. They are placed at the under part of the bones of the laſt joints of the fingers and toes.

SESAMUM, OILY GRAIN; a genus of plants belonging to the claſs didynamia; and in the natural ſyſtem ranging under the 20th order, *Luridæ.* See BOTANY *Index.*

SESELI, MEADOW SAXIFRAGE; a genus of plants belonging to the claſs pentandria; and in the natural ſyſtem ranging under the 45th order, *Umbellatæ.* See BOTANY *Index.*

SESOSTRIS, king of Egypt. See EGYPT, p. 591.

SESQUI, a Latin particle, ſignifying a whole and a half; which, joined with *altera*, *terza*, *quarta*, &c. is much uſed in the Italian muſic to expreſs a kind of ratios, particularly ſeveral ſpecies of triples.

SESQUI-Alterate, in *Geometry* and *Arithmetic*, is a ratio between two lines, two numbers, or the like, where one of them contains the other once, with the addition of a half.

Thus 6 and 9 are in a ſeſqui-alterate ratio; ſince 9 contains 6 once, and 3, which is half of 6, over; and 20 and 30 are in the ſame; as 30 contains 20, and half 20 or 10.

SESQUI-Duplicate ratio, is when of two terms the greater contains the leſs twice, and half the leſs remains; as 15 and 6; 50 and 20.

SESQUI-Tertional proportion, is when any number or quantity contains another once and one third.

SESSILE, among botaniſts. See BOTANY.

SESSION, in general, denotes each ſitting or aſſembly of a council, &c.

SESSION of Parliament, is the ſeaſon or ſpace from its meeting to its prorogation. See PARLIAMENT.

Kirk-SESSION, the name of a petty eccleſiaſtical court in Scotland. See *KIRK-Seſſion.*

SESSIONS for weights and meaſures. In London, four juſtices from among the mayor, recorder, and aldermen (of whom the mayor and recorder is to be one), may hold a ſeſſion to inquire into the offences of ſelling by falſe weights and meaſures, contrary to the ſtatutes; and to receive indictments, puniſh offenders, &c. Char. King Charles I.

Court of SESSION. See LAW, Part III. Sect ii.

Court of Quarter-SESSIONS, an Engliſh court that muſt be held in every county once in every quarter of a year; which, by ſtatute 2 Henry V. c. 4. is appointed to be in the firſt week after Michaelmas-day, the firſt week after the epiphany, the firſt week after the cloſe of Eaſter, and in the week after the tranſlation of St Thomas the martyr, or the 7th of July. It is held before two or more juſtices of the peace, one of which muſt be of the quorum. The juriſdiction of this court, by 34 Edward III. c. 1. extends to the trying and determining all felonies and treſpaſſes whatſoever: though they ſeldom,

Seſſion, Seſterce.

dom, if ever, try any greater offence than ſmall felonies within the benefit of clergy; their commiſſion providing, that if any caſe of difficulty ariſes, they ſhall not proceed to judgement, but in the preſence of one of the juſtices of the courts of king's bench or common-pleas, or one of the judges of aſſize: and therefore murders, and other capital felonies, are uſually remitted for a more ſolemn trial to the aſſizes. They cannot alſo try any new-created offence, without expreſs power given them by the ſtatute which creates it. But there are many offences and particular matters which, by particular ſtatutes, belong properly to this juriſdiction, and ought to be proſecuted in this court; as, the ſmaller miſdemeanors againſt the public or commonwealth, not amounting to felony; and eſpecially offences relating to the game, highways, alehouſes, baſtard children, the ſettlement and proviſion for the poor, vagrants, ſervants wages, and Popiſh recuſants. Some of theſe are proceeded upon by indictment: others in a ſummary way, by motion, and order thereupon; which order may for the moſt part, unleſs guarded againſt by particular ſtatutes, be removed into the court of king's-bench by writ of *certiorari facias*, and be there either quaſhed or confirmed. The records or rolls of the ſeſſions are committed to the cuſtody of a ſpecial officer, denominated *cuſtos rotulorum*, who is always a juſtice of the quorum; and among them of the quorum (ſaith Lambard) a man for the moſt part eſpecially picked out, either for wiſdom, countenance, or credit. The nomination of the *cuſtos rotulorum* (who is the principal officer in the county, as the lord-lieutenant is chief in military command) is by the king's ſign manual: and to him the nomination of the clerk of the peace belongs; which office he is expreſsly forbidden to ſell for money.

In moſt corporation-towns there are quarter-ſeſſions kept before juſtices of their own, within their reſpective limits; which have exactly the ſame authority as the general quarter-ſeſſions of the county, except in a very few inſtances; one of the moſt conſiderable of which is the matter of appeals from orders of removal of the poor, which, though they be from the orders of corporation-juſtices, muſt be to the ſeſſions of the county, by ſtatute 8 and 9 William III. c. 30. In both corporations and counties at large, there is ſometimes kept a ſpecial or petty ſeſſion, by a few juſtices, for diſpatching ſmaller buſineſs in the neighbourhood between the times of the general ſeſſions; as for licenſing alehouſes, paſſing the account of pariſh officers, and the like.

SESTERCE, SESTERTIUS, a ſilver coin, in uſe among the ancient Romans, called alſo ſimply *nummus*, and ſometimes *nummus ſeſtertius*. The ſeſtertius was the fourth part of the denarius, and originally contained two aſſes and a half. It was at firſt denoted by LLS; the two L's ſignifying two libræ, and the S half. But the librarii, afterwards converting the two L's into an H, expreſſed the ſeſtertius by HS. The word *ſeſtertius* was firſt introduced by way of abbreviation for *ſemiſtertius*, which ſignifies two, and a half of a third, or, literally, only half a third; for in expreſſing half a third, it was underſtood that there were two before.

Some authors make two kinds of ſeſterces; the leſs called *ſeſtertius*, in the maſculine gender; and the great one, called *ſeſtertium*, in the neuter: the firſt, that we have already deſcribed; the latter containing a thouſand of the other. Others will have any ſuch diſtinction of great and little ſeſterces unknown to the Romans: *ſeſtertius*, ſay they, was an adjective, and ſignified *as ſeſtertius*, or two aſſes and a half; and when uſed in the plural, as in *quinquaginta ſeſtertium*, or *ſeſtertia*, it was only by way of abbreviation, and there was always underſtood *centena*, *millia*, &c. Seſterce.

This matter has been accurately ſtated by Mr Raper, in the following manner. The ſubſtantive to which ſeſtertius referred is either *as*, or *pondus*; and *ſeſtertius as* is two aſſes and a half; *ſeſtertium pondus*, two pondera and a half, or two hundred and fifty denarii. When the denarius paſſed for ten aſſes, the ſeſtertius of two aſſes and a half was a quarter of it; and the Romans continued to keep their accounts in theſe ſeſterces long after the denarius paſſed for ſixteen aſſes; till, growing rich, they found it more convenient to reckon by quarters of the denarius, which they called *nummi*, and uſed the words *nummus* and *ſeſtertius* indifferently, as ſynonymous terms, and ſometimes both together, as *ſeſtertius nummus*; in which caſe the word *ſeſtertius*, having loſt its original ſignification, was uſed as a ſubſtantive; for *ſeſtertius nummus* was not two nummi and a half, but a ſingle nummus of four aſſes. They called any ſum under two thouſand ſeſterces ſo many *ſeſtertii* in the maſculine gender; two thouſand ſeſterces they called *duo* or *bina ſeſtertia*, in the neuter; ſo many quarters making five hundred denarii, which was twice the ſeſtertium; and they ſaid *dena*, *vicena*, &c. *ſeſtertia*, till the ſum amounted to a thouſand ſeſtertia, which was a million of ſeſterces. But, to avoid ambiguity, they did not uſe the neuter *ſeſtertium* in the ſingular number, when the whole ſum amounted to no more than a thouſand ſeſterces, or one ſeſtertium. They called a million of ſeſterces *decies nummûm*, or *decies ſeſtertiûm*, for *decies centena millia nummorum*, or *ſeſtertiorum* (in the maſculine gender), omitting *centena millia* for the ſake of brevity. They likewiſe called the ſame ſum *decies ſeſtertium* (in the neuter gender) for *decies centies ſeſtertium*, omitting *centies* for the ſame reaſon; or ſimply *decies*, omitting *centena millia ſeſtertiûm*, or *centies ſeſtertium*; and with the numeral adverbs *decies*, *vicies*, *centies*, *millies*, and the like, either *centena millia* or *centies* was always underſtood. Theſe were their moſt uſual forms of expreſſion; though for *bina*, *dena*, *vicena ſeſtertia*, they frequently ſaid *bina*, *dena*, *vicena millia nummûm*. If the conſular denarius contained 60 troy grains of fine ſilver, it was worth ſomewhat more than eight-pence farthing and a half ſterling; and the as, of 16 to the denarius, a little more than a half-penny. To reduce the ancient ſeſterces of two aſſes and a half, when the denarius paſſed for 16, to pounds ſterling, multiply the given number by 5454, and cut off ſix figures on the right hand for decimals. To reduce *nummi ſeſtertii*, or quarters of the denarius, to pounds ſterling; if the given ſum be conſular money, multiply it by 8727, and cut off ſix figures on the right hand for decimals; but for imperial money diminiſh the ſaid product by one-eighth of itſelf. Phil. Tranſ. vol. lxi. part ii. art. 48.

To be qualified for a Roman knight, an eſtate of 400,000 *ſeſterces* was required; and for a ſenator, of 800,000.

Authors alſo mention a copper *ſeſterce*, worth about one-third of a penny Engliſh.

SESTERCE, or *ſeſtertius*, was alſo uſed by the ancients

Seſtos || Seth.

for a thing containing two wholes and an half of another, as *as* was taken for any whole or integer.

SESTOS, a noted fortreſs of European Turkey, ſituated at the entrance of the Helleſpont or Dardanelles, 24 miles ſouth-weſt of Gallipoli. This place is famous for the loves of HERO and LEANDER, ſung by the poet Muſæus.

SESUVIUM, a genus of plants belonging to the claſs icoſandria. See BOTANY *Index*.

SET, or SETS, a term uſed by the farmers and gardeners to expreſs the young plants of the white thorn and other ſhrubs, with which they uſe to raiſe their quick or quick-ſet hedges. The white thorn is the beſt of all trees for this purpoſe; and, under proper regulations, its ſets ſeldom fail of anſwering the farmer's utmoſt expectations.

SET-off, in *Law*, is an act whereby the defendant acknowledges the juſtice of the plaintiff's demand on the one hand; but, on the other, ſets up a demand of his own, to counterbalance that of the plaintiff, either in the whole, or in part: as, if the plaintiff ſues for 10l. due on a note of hand, the defendant may ſet off 9l. due to himſelf for merchandiſe ſold to the plaintiff; and, in caſe he pleads ſuch ſet-off, muſt pay the remaining balance into court. This anſwers very nearly to the *compenſatio* or ſtoppage of the civil law, and depends upon the ſtatutes 2 Geo. II. cap. 22. and 8 Geo. II. cap. 24.

SETACEOUS WORM, in *Natural Hiſtory*, a name given by Dr Liſter to that long and ſlender water-worm, which ſo much reſembles a horſe-hair, that it has been ſuppoſed by the vulgar to be an animated hair of that creature. Theſe creatures, ſuppoſed to be living hairs, are a peculiar ſort of inſects, which are bred and nouriſhed within the bodies of other inſects, as the worms of the ichneumon flies are in the bodies of the caterpillars.

Aldrovand deſcribes the creature, and tells us it was unknown to the ancients; but called *ſeta aquatica*, and *vermis ſetarius*, by the moderns, either from its figure reſembling that of a hair, or from the ſuppoſition of its once having been the hair of ſome animal. We generally ſuppoſe it, in the imaginary ſtate of the hair, to have belonged to a horſe; but the Germans ſay it was once the hair of a calf, and call it by a name ſignifying *vitulus aquaticus*, or the "water calf."

Albertus, an author much reverenced by the common people, has declared that this animal is generated of a hair; and adds, that any hair thrown into ſtanding water, will, in a very little time, obtain life and motion. Other authors have diſſented from this opinion, and ſuppoſed them generated of the fibrous roots of water-plants; and others, of the parts of graſshoppers fallen into the water. This laſt opinion is rejected by Aldrovand as the moſt improbable of all. Standing and foul waters are moſt plentifully ſtored with them; but they are ſometimes found in the cleareſt and pureſt ſprings, and ſometimes out of the water, on the leaves of trees and plants, as on the fruit-trees in our gardens, and the elms in hedges. They are from three to five inches long, of the thickneſs of a large hair; and are brown upon the back, and white under the belly, and the tail is white on every part.

SETH, the third ſon of Adam, the father of Enos, was born 3874 B. C. and lived 912 years.

SETHIANS, in church-hiſtory, Chriſtian heretics; ſo called becauſe they paid divine worſhip to Seth, whom they looked upon to be Jeſus Chriſt the ſon of God, but who was made by a third divinity, and ſubſtituted in the room of the two families of Abel and Cain, which had been deſtroyed by the deluge. Theſe heretics appeared in Egypt in the ſecond century; and as they were addicted to all ſorts of debauchery, they did not want followers; and continued in Egypt above 200 years.

Sethians || Severance.

SETIMO, a town of Italy, in the province of Piedmont, ſituated on the river Po, eight miles north of Turin.

SETON, in *Surgery*, a few horſe hairs, ſmall threads, or large packthread, drawn through the ſkin, chiefly the neck, by means of a large needle or probe, with a view to reſtore or preſerve health.

Experience ſhews that ſetons are uſeful in catarrhs, inflammations, and other diſorders, and particularly thoſe of the eyes; to theſe may be added ſevere headachs, with ſtupor, drowſineſs, epilepſies, and even apoplexy itſelf. See SURGERY.

SETTEE, in ſea-language, a veſſel very common in the Mediterranean with one deck and a very long and ſharp prow. They carry ſome two maſts, ſome three, without top-maſts. They have generally two maſts, equipped with triangular ſails, commonly called *lateen ſails*. The leaſt of them are of 60 tons burden. They ſerve to tranſport cannon and proviſions for ſhips of war and the like. Theſe veſſels are peculiar to the Mediterranean ſea, and are uſually navigated by Italians, Greeks, or Mahometans.

SETTING, in *Aſtronomy*, the withdrawing of a ſtar or planet, or its ſinking below the horizon. Aſtronomers and poets make three different kinds of ſetting of the ſtars, viz. the COSMICAL, ACRONYCAL, and HELIACAL. See theſe articles.

SETTING, in the ſea language. To ſet the land or the ſun by the compaſs, is to obſerve how the land bears on any point of the compaſs, or on what point of the compaſs the ſun is. Alſo when two ſhips ſail in ſight of one another, to mark on what point the chaſed bears, is termed *ſetting the chace by the compaſs*.

SETTING, among ſportſmen, a term uſed to expreſs the manner of taking partridges by means of a dog peculiarly trained to that purpoſe. See SHOOTING.

ACT OF SETTLEMENT, in Britiſh hiſtory, a name given to the ſtatute 12 and 13 Will. III. cap. 2. whereby the crown was limited to his preſent majeſty's illuſtrious houſe; and ſome new proviſions were added, at the ſame fortunate era, for better ſecuring our religion, laws, and liberties: which the ſtatute declares to be the birthright of the people of England, according to the ancient doctrine of the common law.

SEVEN STARS, a common denomination given to the cluſter of ſtars in the neck of the ſign Taurus, the bull; properly called the *Pleiades*. They are ſo called from their number ſeven, which appear to the naked eye, though ſome eyes can diſcover only ſix of them; but by the aid of teleſcopes there appears to be a great multitude of them.

SEVENTH, in *Muſic*, an interval called by the Greeks *heptachordon*. See INTERVAL.

SEVERANCE, in *Law*, the ſingling or ſevering two or more that join or are joined in the ſame writ or action.

Severance
||
Severn.

tion. As if two join in a writ, *de libertate probanda*, and the one be afterwards nonſuited; here ſeverance is permitted, ſo as notwithſtanding the nonſuit of the one, the other may ſeverally proceed.

There is alſo ſeverance of the tenants in aſſize; when one, two, or more diſſeiſees appear upon the writ, and not the other. And ſeverance in debt, where two executors are named plaintiffs, and the one refuſes to proſecute. We alſo meet with ſeverance of ſummons, ſeverance in attaints, &c. An eſtate in joint tenancy may be ſevered and deſtroyed by deſtroying any of its unities. 1. That of time, which reſpects only the original commencement of the joint eſtate, cannot indeed (being now part) be affected by any ſubſequent tranſaction. But, 2. The joint-tenants eſtate may be deſtroyed without any alienation, by merely diſuniting their poſſeſſion. 3. The jointure may be deſtroyed, by deſtroying the unity of title. And, 4. By deſtroying the unity of intereſt.

SEVERIA, a province of the Ruſſian empire, with the title of a duchy, bounded on the north by Smolenſko and Muſcovy, on the eaſt by Vorotinſbi and the country of the Coſſacks, on the ſouth by the ſame, and on the weſt by Zernegovia. It is a country overrun with woods, and on the ſouth part is a foreſt of great length. Novogrodec, or Novogorod, is the capital town.

St SEVERINA, a town of Italy, in the kingdom of Naples, and in Lower Calabria, with an archbiſhop's ſee. It is very well fortified, and ſeated on a craggy rock, on the river Neeto; in E. Long. 17. 14. N. Lat. 39. 15.

SEVERINO, a town of Italy, in the territory of the church, and in the Marche of Ancona, with a biſhop's ſee. It has fine vineyards, and is ſeated between two hills on the river Petenza, in E. Long. 13. 6. N. Lat. 43. 16.

SEVERN, a river of England which riſes near Plimlimmon Hill in Montgomeryſhire, and before it enters Shropſhire receives about 30 ſtreams, and paſſes down to Laudring, where it receives the Morda, that flows from Oſweſtry. When it arrives at Monford, it receives the river Mon, paſſing on to Shrewſbury, which it almoſt ſurrounds, then to Bridgeworth; afterwards it runs through the ſkirts of Staffordſhire, enters Worceſterſhire, and paſſes by Worceſter; then it runs to Tewkeſbury, where it joins the Avon, and from thence to Glouceſter, keeping a north-weſterly courſe, till it falls into the Briſtol Channel. It begins to be navigable for boats at Welchpool, in Montgomeryſhire, and takes in ſeveral other rivers in its courſe, beſides thoſe already mentioned, and *is the ſecond in England*. By the late inland navigation, it has communication with the rivers Merſey, Dee, Ribble, Ouſe, Trent, Derwent, Humber, Thames, Avon, &c. which navigation, including its windings, extends above 500 miles in the counties of Lincoln, Nottingham, York, Lancaſter, Weſtmoreland, Cheſter, Stafford, Warwick, Leiceſter, Oxford, Worceſter, &c. A canal from Stroud-Water, a branch of the Severn, to join the Thames, was projected and executed for the purpoſe of conveying a tunnel 16 feet high and 16 feet wide, under Sapperton Hill and Hayley-Wood (very high ground), for two miles and a quarter in length, through a very hard rock, which was lined and arched with brick. This ſtupendous undertaking was completed, and boats paſſed through it the 21ſt of May 1789. By this opening, a communication is made between the river Severn at Framiload and the Thames near Lechlade, and will be continued over the Thames near Ingleſham, into deep water in the Thames below St John-Bridge, and ſo to Oxford, &c. and London, for conveyance of coals, goods, &c. It is now navigable from the Severn to Themsford, by way of Stroud, Cirenceſter, Cricklade, &c. being filled with water for that purpoſe near 40 miles.

Lucombe's Engliſh Gazetteer.

Severn, Severus.

SEVERUS, Cornelius, an ancient Latin poet of the Auguſtan age; whoſe *Ætna*, together with a fragment *De morte Ciceronis*, were publiſhed, with notes and a proſe interpretation, by Le Clerc, 12mo, Amſterdam, 1703. They were before inſerted among the *Catalecta Virgilii* publiſhed by Scaliger; whoſe notes, with others, Le Clerc has received among his own.

Severus, *Septimus*, a Roman emperor, who has been ſo much admired for his military talents, that ſome have called him the moſt warlike of the Roman emperors. As a monarch he was cruel, and it has been obſerved that he never did an act of humanity or forgave a fault. In his diet he was temperate, and he always ſhowed himſelf an open enemy to pomp and ſplendor. He loved the appellation of a man of letters, and he even compoſed an hiſtory of his own reign, which ſome have praiſed for its correctneſs and veracity. However cruel Severus may appear in his puniſhments and in his revenge, many have endeavoured to exculpate him, and obſerved that there was need of ſeverity in an empire where the morals were ſo corrupted, and where no leſs than 3000 perſons were accuſed of adultery during the ſpace of 17 years. Of him, as of Auguſtus, ſome were diſpoſed to ſay, that it would have been better for the world if he had never been born, or had never died. See Rome, N° 372.

Severus's Wall, in Britiſh topography, the fourth and laſt barrier erected by the Romans againſt the incurſions of the North Britons. See the articles Adrian, and *Antoninus's Wall*.

We learn from ſeveral hints in the Roman hiſtorians, that the country between the walls of Hadrian and Antoninus continued to be a ſcene of perpetual war and ſubject of contention between the Romans and Britons, from the beginning of the reign of Commodus to the arrival of the emperor Septimius Severus in Britain, A. D. 206. This laſt emperor having ſubdued the Mæatæ, and repulſed the Caledonians, determined to erect a ſtronger and more impenetrable barrier than any of the former, againſt their future incurſions.

Though neither Dio nor Herodian make any mention of a wall built by Severus in Britain for the protection of the Roman province, yet we have abundant evidence from other writers of equal authority, that he really built ſuch a wall. "He fortified Britain (ſays Spartian) with a wall drawn croſs the iſland from ſea to ſea; which is the greateſt glory of his reign. After the wall was finiſhed, he retired to the next ſtation (York), not only a conqueror, but the founder of an eternal peace." To the ſame purpoſe, Aurelius Victor and Oroſius, to ſay nothing of Eutropius and Caſſiodorus: "Having repelled the enemy in Britain, he fortified the country, which was ſuited to that purpoſe, with a wall drawn croſs the iſland from ſea to ſea."—"Severus drew a great ditch, and built a ſtrong wall, fortified

Severus. fortified with ſeveral turrets, from ſea to ſea, to protect that part of the iſland which he had recovered from the yet unconquered nations." As the reſidence of the emperor Severus in Britain was not quite four years, it is probable that the two laſt of them were employed in building this wall; according to which account, it was begun A. D. 209, and finiſhed A. D. 211.

This wall of Severus was built nearly on the ſame tract with Hadrian's rampart, at the diſtance only of a few paces north. The length of this wall, from Couſin's houſe near the mouth of the river Tyne on the eaſt, to Boulneſs on the Solway frith on the weſt, hath been found, from two actual menſurations, to be a little more than 68 Engliſh miles, and a little leſs than 74 Roman miles. To the north of the wall was a broad and deep ditch, the original dimenſions of which cannot now be aſcertained, only it ſeems to have been larger than that of Hadrian. The wall itſelf, which ſtood on the ſouth brink of the ditch, was built of freeſtone, and where the foundation was not good, it is built on piles of oak; the interſtices between the two faces of this wall is filled with broad thin ſtones, placed not perpendicularly, but obliquely on their edges; the running mortar or cement was then poured upon them, which, by its great ſtrength and tenacity, bound the whole together, and made it firm as a rock. But though theſe materials are ſufficiently known, it is not eaſy to gueſs where they were procured, for many parts of the wall are at a great diſtance from any quarry of freeſtone; and, though ſtone of another kind was within reach, yet it does not appear to have been anywhere uſed. The height of this wall was 12 feet beſides the parapet, and its breadth 8 feet, according to Bede, who lived only at a ſmall diſtance from the eaſt end of it, and in whoſe time it was in many places almoſt quite entire. Such was the wall erected by the command and under the direction of the emperor Severus in the north of England; and, conſidering the length, breadth, height, and ſolidity, it was certainly a work of great magnificence and prodigious labour. But the wall itſelf was but a part, and not the moſt extraordinary part, of this work. The great number and different kinds of fortreſſes which were built along the line of it for its defence, and the military ways with which it was attended, are ſtill more worthy of our admiration, and come now to be deſcribed.

The fortreſſes which were erected along the line of Severus's wall for its defence, were of three different kinds, and three different degrees of ſtrength; and were called by three different Latin words, which may be tranſlated *ſtations*, *caſtles*, and *turrets*. Of each of theſe in their order.

The *ſtationes*, ſtations, were ſo called from their ſtability and the ſtated reſidence of garriſons. They were alſo called *caſtra*, which hath been converted into *cheſtres*, a name which many of them ſtill bear. Theſe were by far the largeſt, ſtrongeſt, and moſt magnificent of the fortreſſes which were built upon the wall, and were deſigned for the head-quarters of the cohorts of troops which were placed there in garriſon, and from whence detachments were ſent into the adjoining caſtles and turrets. Theſe ſtations, as appears from the veſtiges of them which are ſtill viſible, were not all exactly of the ſame figure nor of the ſame dimenſions; ſome of them being exactly ſquares, and others oblong, and ſome of them a little larger than others. Theſe variations were Severus. no doubt occaſioned by the difference of ſituation and other circumſtances. The ſtations were fortified with deep ditches and ſtrong walls, the wall itſelf coinciding with and forming the north wall of each ſtation. Within the ſtations were lodgings for the officers and ſoldiers in garriſon; the ſmalleſt of them being ſufficient to contain a cohort, or 600 men. Without the walls of each ſtation was a town, inhabited by labourers, artificers, and others, both Romans and Britons, who choſe to dwell under the protection of theſe fortreſſes. The number of the ſtations upon the wall was exactly 18; and if they had been placed at equal diſtances, the interval between every two of them would have been four miles and a few paces: but the intervention of rivers, marſhes, and mountains; the conveniency of ſituations for ſtrength, proſpect, and water; and many other circumſtances to us unknown, determined them to place theſe ſtations at unequal diſtances. The ſituation which was always choſen by the Romans, both here and everywhere elſe in Britain where they could obtain it, was the gentle declivity of a hill, near a river, and facing the meridian ſun. Such was the ſituation of the far greateſt part of the ſtations on this wall. In general, we may obſerve, that the ſtations ſtood thickeſt near the two ends and in the middle, probably becauſe the danger of invaſion was greateſt in theſe places. But the reader will form a clearer idea of the number of theſe ſtations, their Latin and Engliſh names, their ſituation and diſtance from one another, by inſpecting the following table, than we can give him with equal brevity in any other way. The firſt column contains the number of the ſtation, reckoning from eaſt to weſt; the ſecond contains its Latin, and the third its Engliſh name; and the three laſt its diſtance from the next ſtation to the weſt of it, in miles, furlongs, and chains.

N°	Latin Name.	Engliſh Name.	M.	F.	C.
1	Segedunum	Couſin's-houſe	3	5	1½
2	Pons Ælii	Newcaſtle	2	0	9
3	Condercum	Benwell hill	6	6	5
4	Vindobala	Rutcheſter	7	0	3½
5	Hunnum	Halton-cheſters	5	1	7
6	Cilurnum	Walwick-cheſters	3	1	8
7	Procolitia	Carrawbrugh	4	5	3½
8	Borcovicus	Houſeſteeds	1	3	8
9	Vindolana	Little-cheſters	3	6	4
10	Æſica	Great-cheſters	2	1	6½
11	Magna	Carrvoran	2	6	0
12	Amboglana	Burdoſwald	6	2	8
13	Petriana	Cambeck	2	6	6
14	Aballaba	Watchcroſs	5	1	9
15	Congavata	Stanwix	3	3	4
16	Axelodunum	Brugh	4	0	9
17	Gabroſentum	Brumbrugh	3	4	1
18	Tunnocelum	Boulneſs	0	0	0
		Length of the wall	68	3	3

The *caſtella*, or caſtles, were the ſecond kind of fortifications which were built along the line of this wall for its defence. Theſe caſtles were neither ſo large nor

ſtrong

Severus. ſtrong as the ſtations, but much more numerous, being no fewer than 81. The ſhape and dimenſions of the caſtles, as appears from the foundations of many of them which are ſtill viſible, were exact ſquares of 66 feet every way. They were fortified on every ſide with thick and lofty walls, but without any ditch, except on the north ſide; on which the wall itſelf, raiſed much above its uſual height, with the ditch attending it, formed the fortification. The caſtles were ſituated in the intervals between the ſtations, at the diſtance of about ſeven furlongs from each other; though particular circumſtances ſometimes occaſioned a little variation. In theſe caſtles, guards were conſtantly kept by a competent number of men detached from the neareſt ſtations.

The *turres*, or turrets, were the third and laſt kind of fortifications on the wall. Theſe were ſtill much ſmaller than the caſtles, and formed only a ſquare of about 12 feet, ſtanding out of the wall on its ſouth ſide. Being ſo ſmall, they are more entirely ruined than the ſtations and caſtles, which makes it difficult to diſcover their exact number. They ſtood in the intervals between the caſtles; and from the faint veſtiges of a few of them, it is conjectured that there were four of them between every two caſtles, at the diſtance of about 300 yards from one another. According to this conjecture, the number of the turrets amounted to 324. They were deſigned for watch-towers and places for ſentinels, who, being within hearing of one another, could convey an alarm or piece of intelligence to all parts of the wall in a very little time.

Such were the ſtations, caſtles, and turrets, on the wall of Severus; and a very conſiderable body of troops was conſtantly quartered in them for its defence. The uſual complement allowed for this ſervice was as follows:

1. Twelve cohorts of foot, conſiſting of 600 men each, - - -	7200
2. One cohort of mariners in the ſtation at Boulneſs, - - - - -	600
3. One detachment of Moors, probably equal to a cohort, - - - -	600
4. Four alæ or wings of horſe, conſiſting, at the loweſt computation, of 400 each, -	1600
	10,000

For the conveniency of marching theſe troops from one part of the wall to another, with the greater eaſe and expedition, on any ſervice, it was attended with two military ways, paved with ſquare ſtones, in the moſt ſolid and beautiful manner. One of theſe ways was ſmaller, and the other larger. The ſmaller military way run cloſe along the ſouth ſide of the wall, from turret to turret, and caſtle to caſtle, for the uſe of the ſoldiers in relieving their guards and centinels, and ſuch ſervices. The larger way did not keep ſo near the wall, nor touch at the turrets or caſtles, but purſued the moſt direct courſe from one ſtation to another, and was deſigned for the conveniency of marching larger bodies of troops.

It is to be regretted, that we cannot gratify the reader's curioſity, by informing him by what particular bodies of Roman troops the ſeveral parts of this great work were executed; as we were enabled to do with regard to the wall of Antoninus Pius from inſcriptions. For Severus. though it is probable that there were ſtones with inſcriptions of the ſame kind, mentioning the ſeveral bodies of troops, and the quantity of work performed by each of them, originally inſerted in the face of this wall, yet none of them are now to be found. There have indeed been diſcovered, in or near the ruins of this wall, a great number of ſmall ſquare ſtones, with very ſhort, and generally imperfect, inſcriptions upon them; mentioning particular legions, cohorts, and centuries; but without directly aſſerting that they had built any part of the wall, or naming any number of paces. Of theſe inſcriptions, the reader may ſee no fewer than twenty-nine among the Northumberland and Cumberland inſcriptions in Mr Horſley's Britannia Romana. As the ſtones on which theſe inſcriptions are cut are of the ſame ſhape and ſize with the other facing-ſtones of this wall, it is almoſt certain that they have been originally placed in the face of it. It is equally certain, from the uniformity of theſe inſcriptions, that they were all intended to intimate ſome one thing, and nothing ſo probable as that the adjacent wall was built by the troops mentioned in them. This was, perhaps, ſo well underſtood, that it was not thought neceſſary to be expreſſed; and the diſtance of theſe inſcriptions from one another ſhowed the quantity of work performed. If this was really the caſe, we know in general, that this great work was executed by the ſecond and ſixth legions, theſe being the only legions mentioned in theſe inſcriptions. Now, if this prodigious wall, with all its appendages of ditches, ſtations, caſtles, turrets, and military ways, was executed in the ſpace of two years by two legions only, which, when moſt complete, made no more than 12,000 men, how greatly muſt we admire the ſkill, the induſtry, and excellent diſcipline of the Roman ſoldiers, who were not only the valiant guardians of the empire in times of war, but its moſt active and uſeful members in times of peace?

This wall of Severus, and its fortreſſes, proved an impenetrable barrier to the Roman territories for near 200 years. But about the beginning of the 5th century, the Roman empire being aſſaulted on all ſides, and the bulk of their forces withdrawn from Britain, the Mæatæ and Caledonians, now called *Scots* and *Picts*, became more daring; and ſome of them breaking through the wall, and others ſailing round the ends of it, they carried their ravages into the very heart of Provincial Britain. Theſe invaders were indeed ſeveral times repulſed after this by the Roman legions ſent to the relief of the Britons. The laſt of theſe legions, under the command of Gallio of Ravenna, having, with the aſſiſtance of the Britons, thoroughly repaired the breaches of Severus's wall and its fortreſſes, and exhorted the Britons to make a brave defence, took their final farewell of Britain. It ſoon appeared, that the ſtrongeſt walls and ramparts are no ſecurity to an undiſciplined and daſtardly rabble, as the unhappy Britons then were. The Scots and Picts met with little reſiſtance in breaking through the wall, while the towns and caſtles were tamely abandoned to their deſtructive rage. In many places they levelled it with the ground, that it might prove no obſtruction to their future inroads.—From this time no attempts were ever made to repair this noble work. Its beauty and grandeur procured it no reſpect in the dark and taſteleſs ages which ſucceeded. It became

Sevigné. came the common quarry for more than a thouſand years, out of which all the towns and villages around were built; and is now ſo entirely ruined, that the penetrating eyes of the moſt poring and patient antiquarian can hardly trace its vaniſhing foundations.

SEVIGNE', MARIE DE RABUTIN, MARQUISE DE, a French lady, was born in 1626. When only a year old ſhe loſt her father, who was killed in the deſcent of the Engliſh on the iſle of Rhé, where he commanded a company of volunteers. In 1644 ſhe married the marquis of Sevigné, who was ſlain in a duel by the chevalier d'Albret, in 1651. She had by him a ſon and a daughter, to the education of whom ſhe afterwards religiouſly devoted herſelf. Her daughter was married in 1669 to the count of Grignan, who conducted her to Provence. Madame de Sevigné conſoled herſelf by writing frequent letters to her daughter. She fell at laſt the victim to her maternal tenderneſs. In one of her viſits to Grignan, ſhe fatigued herſelf ſo much during the ſickneſs of her daughter, that ſhe was ſeized with a fever, which carried her off on the 14th of January 1696. We have two portraits of Madame de Sevigné; the one by the compte de Buſſi, the other by Madame de la Fayette. The firſt exhibits her defects; the ſecond her excellencies. Buſſi deſcribes her as a lively gay coquette, a lover of flattery, fond of titles, honour, and diſtinction: M. de la Fayette as a woman of wit and good ſenſe, as poſſeſſed of a noble ſoul, formed for diſpenſing benefits, incapable of debaſing herſelf by avarice, and bleſſed with a generous, obliging, and faithful heart. Both theſe portraits are in ſome meaſure juſt. That ſhe was vain-glorious, appears evident from her own letters, which, on the other hand, exhibit undoubted proofs of her virtue and goodneſs of heart.

This illuſtrious lady was acquainted with all the wits of her age. It is ſaid that ſhe decided the famous diſpute between Perrault and Boileau concerning the preference of the ancients to the moderns, thus, "The ancients are the fineſt, and we are the prettieſt." She left behind her a moſt valuable collection of letters, the beſt edition of which is that of 1775, in 8 vols 12mo. "Theſe letters (ſays Voltaire) are filled with anecdotes, written with freedom, and in a natural and animated ſtyle; are an excellent criticiſm on ſtudied letters of wit, and ſtill more on thoſe fictitious letters which aim at the epiſtolary ſtyle, by a recital of falſe ſentiments and feigned adventures to an imaginary correſpondent." It were to be wiſhed that a proper ſelection had been made of theſe letters. It is difficult to read eight volumes of letters, which, though inimitably written, preſent frequent repetitions, and are often filled with trifles. What makes them in general perhaps ſo intereſting is, that they are in part hiſtorical. They may be looked on as a relation of the manners, the ton, the genius, the faſhions, the etiquette, which reigned in the court of Louis XIV. They contain many curious anecdotes nowhere elſe to be found: But theſe excellencies would be ſtill more ſtriking, were they ſometimes ſtripped of that multitude of domeſtic affairs and minute incidents which ought naturally to have died with the mother and the daughter. A volume entitled *Sevigniana* was publiſhed at Paris in 1756, which is nothing more than a collection of the fine ſentiments, literary and hiſtorical anecdotes, and moral apophthegms, ſcattered throughout theſe letters.

Siecle de Louis XIV. tom. ii.

Seville. SEVILLE, a large and populous city of Spain, ſtands on the banks of the Guadalquiver, in the midſt of a rich, and to the eye a boundleſs, plain; in W. Long. 5° 5′, N. Lat. 37° 20′. This city is ſuppoſed to have been founded by the Phœnicians, who gave it the name of *Hiſpalis*. When it fell under the power of the Romans, it was called *Julia*; and at laſt, after a variety of corruptions, was called *Sebilla* or *Sevilla*; both of which names are retained by the Spaniards. The Romans embelliſhed it with many magnificent edifices; of which ſcarce any veſtige now remains. The Gothic kings for ſome time made it their reſidence: but in proceſs of time they removed their court to Toledo; and Seville was taken by ſtorm ſoon after the victory obtained at Xeres over the Gothic king Rodrigo.—In 1027, Seville became an independent monarchy; but was conquered 70 years afterwards by Yuſef Almoravides, an African prince. At laſt it was taken by Ferdinand III. after a year's ſiege; and 300,000 Moors were then obliged to leave the place. Notwithſtanding this prodigious emigration, Seville continued to be a great and populous city, and ſoon after it was enlarged and adorned with many magnificent buildings, the chief of which is the cathedral. Seville arrived at its utmoſt pitch of grandeur a little after the diſcovery of America, the reaſon of which was, that all the valuable productions of the Weſt Indies were carried thither. Its court was then the moſt ſplendid in Europe; but in the courſe of a few years all this grandeur diſappeared, owing to the impediments in navigating the Guadalquiver. The ſuperior excellence of the port of Cadiz induced government to order the galeons to be ſtationed there in time to come.

Seville is of a circular form, and is ſurrounded by a wall about five miles and a half in circumference, containing 176 towers. The ditch in many places is filled up. The ſtreets of Seville are crooked and dirty, and moſt of them ſo narrow that two carriages can ſcarcely paſs one another abreaſt.

Seville is ſaid to contain 80,268 ſouls, and is divided into 30 pariſhes. It has 84 convents, with 24 hoſpitals.

Of the public edifices of this city the cathedral is the moſt magnificent. Its dimenſions are 420 feet in length, 263 in breadth within the walls, and 126 feet in height. It has nine doors, 80 altars, at which 500 maſſes are daily celebrated, and 80 windows of painted glaſs, each of which coſt 1000 ducats. At one angle ſtands a tower of Mooriſh workmanſhip 350 feet high. On the top of it is the giralda, or large brazen image, which, with its palm branch, weighs near one ton and a half, yet turns as a weather-cock with the ſlighteſt variation of the wind. The whole work is brick and mortar. The paſſage to the top is an inclined plane, which winds about in the inſide in the manner of a ſpiral ſtaircaſe, ſo eaſy of aſcent that a horſe might trot from the bottom to the top; at the ſame time it is ſo wide that two horſemen may ride abreaſt. What appears very unaccountable, the ſolid maſonry in the upper half is juſt as thick again as that in the lower, though on the outſide the tower is all the way of the ſame dimenſions. In the opinion of Mr Swinburne, this cathedral is inferior to

Townſend's Travels, vol. ii.

York-

Seville. York minſter. Its treaſures are ineſtimable; one altar with all its ornaments is ſolid ſilver; of the ſame metal are the images of St Iſidore and St Leander, which are as large as the life; and a tabernacle for the hoſt more than four yards high, adorned with 48 columns. Before the choir of the cathedral is the tomb of the celebrated Chriſtopher Columbus, the diſcoverer of America. His monument conſiſts of one ſtone only, on which theſe words are inſcribed, *A Caſtella y Arragon otro mundo dio Colon;* that is, "To Caſtile and Arragon Columbus gave another world:" an inſcription ſimple and expreſſive, the juſtneſs of which will be acknowledged by thoſe who have read the adventures of this illuſtrious but unfortunate man. The cathedral was begun by Don Sancho the Brave, about the cloſe of the 13th century, and finiſhed by John II. about an hundred years after. To the cathedral belongs a library of 20,000 volumes, collected by Hernando the ſon of Columbus; but, to the diſgrace of the Spaniards, it has ſcarcely received any addition ſince the death of the founder. The organ in this cathedral is a very ingenious piece of mechaniſm †. "I was much pleaſed (ſays Mr Townſend in his intereſting travels) with the conſtruction of a new organ, containing 5300 pipes, with 110 ſtops, which latter, as the builder told me, is 50 more than are in the famous one of Haerlem; yet, ſo ample are the bellows, that when ſtretched they ſupply the full organ 15 minutes. The mode of filling them with air is ſingular; for, inſtead of working with his hands, a man walks backwards and forwards along an inclined plane of about 15 feet in length, which is balanced in the middle on its axis; under each end is a pair of bellows, of about ſix feet by three and a half. Theſe communicate with five other pairs united by a bar; and the latter are ſo contrived, that when they are in danger of being overſtrained, a valve is lifted up, and gives them relief. Paſſing 10 times along the inclined plane fills all theſe veſſels."

Bourgoanne's Travels, vol. ii.

† Vol. ii. p. 318.

Swinburne's Travels, p. 283.

The Canos de Carmone, or great aqueduct of Seville, is reckoned by the hiſtorians of this city one of the moſt wonderful works of antiquity. Mr Swinburne, however, remarks, that it is ugly, crooked, the arches unequal, and the architecture neglected. The conduit is ſo leaky, that a rivulet is formed by the waſte water. Nevertheleſs, it ſtill conveys to the city an ample ſupply of water ſufficient to turn ſeveral mills, and to give almoſt every houſe in town the benefit of it.

Many of the convents are remarkable for the beauty of their architecture; but in Seville the eye covets only pictures, of which there is a wonderful profuſion. Among theſe are the works of the famous painter Murillo, with many others univerſally admired.

The convent of the Franciſcans contains 15 cloiſters, with apartments for 200 monks, though, when Mr Townſend viſited them, they amounted only to 140. The annual expenditure of theſe, who are all fed on charity, is about 4000l. ſterling. "In the principal cloiſter (ſays the ſame intelligent traveller), which is entirely incloſed by a multitude of little chapels, are repreſented, in 14 pictures, each called a *ſtation*, all the ſufferings of the Redeemer. Theſe are ſo arranged as to mark given diſtances by walking round the cloiſter from the firſt to the ſecond, and ſo in order to the reſt. Over them is mentioned the number of ſteps taken by our Lord between the ſeveral incidents of his paſſion in his way to Calvary; and theſe preciſely are the paces meaſured for the penitents in their progreſs from one ſtation to another. Over one is the following inſcription: 'This ſtation conſiſts of 1087 ſteps. Here the bleſſed Redeemer fell a ſecond time under the weight of his croſs, and here is to be gained the indulgence of ſeven years and forty quarantines. Mental prayer, the Paternoſter, and the Ave Maria.' This may ſerve as an example for the reſt."

Townſend's Travels, vol. ii. p. 326.

The principal manufacture of Seville is ſnuff. Mr Townſend, who paid particular attention to it, informs us, that the building in which it is carried on is elegant and ſimple in its form, and is about 600 feet by 480, and not leſs than 60 feet in height, with four regular fronts, incloſing 28 quadrangles. It coſt 37,600,000 of reals, or about 370,000l. At preſent (1787), no more than 1700 workmen are employed, and 100 horſes or mules; but formerly 3000 men were engaged, and near 400 horſes. This falling off is attributed by Mr Swinburne to a practice which the directors followed, of adulterating the tobacco with the red earth of Almazarron. When Mr Townſend viſited this manufacture, they had changed their ſyſtem. From the year 1780, he informs us, the annual ſale of tobacco from Brazil has been 1,500,000 pounds, purchaſed from the Portugueſe at three reals a pound; and of ſnuff from the produce of their own colonies 1,600,000 pounds, beſide *cigars* (A) to a very conſiderable amount. They have lying by them more than 5,000,000 pounds of ſnuff unſold; but as it will not ſuffer by age, they are not uneaſy at this accumulation. Beſides the peculiar kind of ſnuff with which Spain was accuſtomed to ſupply the market, they have lately introduced the manufacture of rappee. In this branch alone are employed 220 perſons, old and young, with 16 mules.

Seville.

"All the workmen (continues Mr Townſend) depoſit their cloaks at the door; and when they go out are ſo ſtrictly examined, that they have little chance of being able to conceal tobacco; yet they ſometimes venture to hide it about their perſons. An officer and a guard is always attending to take delinquents into cuſtody; and that they may prevent reſiſtance, no workman is permitted to enter with a knife. Were it not for this precaution, the conſequence of a detection might be fatal. The whole buſineſs is conducted by a director, with a ſalary of 40,000 reals a-year, and 54 ſuperior officers, aſſiſted by as many ſubordinate to them. For grinding their ſnuff, they have 40 mills, each conſiſting of a ſtone roller, moved by a large horſe or mule, with the traces faſtened to a beam of eight feet in length, in the angle of 45 degrees, conſequently loſing preciſely half his force."

Before Mr Townſend left Seville, according to his uſual practice, which was truly laudable, he enquired into the prices of labour and proviſions. As a piece of

(A) Theſe are little rolls of tobacco which the Spaniards ſmoke without a pipe.

Seville ‖ Sewer.

curious and useful information, and as an example to other travellers, we present them to our readers. They are as follows:

Day-labourers	4½ reals, about	L. 0	0	10¼
Carpenters from 7 to 11	——			
Joiners, if good workmen,	24 —— or	0	4	9
Weavers, if good workmen, 15 reals, about		0	3	0
Bread, for 3 lb. of 16 oz. 16 quartos, or		0	0	4½
—— sometimes 28 quartos, or		0	0	7⅞
Beef, 30 quartos for 32 oz. per lb. about		0	0	4½
Mutton, 38 do. do.		0	0	5⅓½
Kid, 24 do.		0	0	3⅜
Pork from 36 to 42 quartos, do.	or	0	0	5 1/16
	to	0	0	5 3/11

The price of wheat has at different periods been very remarkable. In 1652, it sold at the rate of 15s. 3½d. the bushel; and in 1657, it fell so low as 1s. 4½d. per bushel, reckoning the fanega at 109½ lb. and the bushel at 70.

SEVUM MINERALE, mineral tallow; a substance somewhat resembling tallow, found on the sea-coasts of Finland in the year 1736. It burns with a blue flame, and smell of grease, leaving a black viscid matter which cannot easily be consumed. It is extremely light; being only of the specific gravity of 0.770; whereas tallow is not less than 0.969. It is partly soluble in highly rectified spirit of wine; but entirely so in expressed oils when boiling. It is met with in some of the rocky parts of Persia, but there it appears to be mixed with petrolæum. Dr Herman of Strasburg mentions a spring in the neighbourhood of that city which contains a substance of this sort diffused through it, separating, and capable of being collected on ebullition.—A fat mineral matter resembling butter or tallow has lately been extracted from peat in Lancashire. See PEAT.

SEWAURY, a Hindoo word used in Bengal, and signifying the train of attendants that accompany a nabob or great man.

SEWER, *in the Household*, an officer who arranged on the table the dishes of a king or nobleman.

SEWER is also a passage or gutter made to carry water into the sea or a river, whereby to preserve the land, &c. from inundations and other annoyances.

Court of Commissioners of SEWERS *in England*, a temporary tribunal, erected by virtue of a commission under the great seal; which formerly used to be granted *pro re nata* at the pleasure of the crown, but now at the discretion and nomination of the lord chancellor, lord treasurer, and chief justices, pursuant to the statute 23 Hen. VIII. c. 5. Their jurisdiction is to overlook the repairs of sea-banks and sea-walls, and the cleansing of rivers, public streams, ditches, and other conduits, whereby any waters are carried off; and is confined to such county or particular district as the commission shall expressly name. The commissioners are a court of record, and may fine and imprison for contempts; and in the execution of their duty may proceed by jury, or upon their own view, and may take order for the removal of any annoyances, or the safeguard and conservation of the sewers within their commission, either according to the laws and customs of Romney-marsh, or otherwise at their own discretion. They may also assess such rates or scots upon the owners of lands within their district as they shall judge necessary: and if any person refuses to pay them, the commissioners may levy the same by distress of his goods and chattels; or they may, by statute 23 Hen. VIII. c. 5. sell his freehold lands (and by the 7 Ann. c. 10. his copyhold also), in order to pay such scots or assessments. But their conduct is under the controul of the court of King's-bench, which will prevent or punish any illegal or tyrannical proceedings. And yet in the reign of King James I. (8th Nov. 1616.), the privy-council took upon them to order, that no action or complaint should be prosecuted against the commissioners unless before that board; and committed several to prison who had brought such actions at common law, till they should release the same: and one of the reasons for discharging Sir Edward Coke from his office of lord chief-justice, was for countenancing those legal proceedings. The pretence for these arbitrary measures was no other than the tyrant's plea of the *necessity* of unlimited powers in works of evident utility to the public, "the supreme reason above all reasons, which is the salvation of the king's lands and people." But now it is clearly held, that this (as well as all other inferior jurisdiction) is subject to the discretionary coercion of his majesty's court of King's-bench. Sewer.

Common SEWERS, in Rome, were executed at a great expence. It was proposed that they should be of sufficient dimensions to admit a waggon loaded with hay. When these common sewers came to be obstructed, or out of repair, under the republic, the censors contracted to pay a thousand talents, or about 193,000l. for clearing and repairing them. They were again in disrepair at the accession of Augustus Cæsar, and the reinstating them is mentioned among the great works of Agrippa. He is said to have turned the course of seven rivers into these subterraneous passages, to have made them navigable, and to have actually passed in barges under the streets and buildings of Rome. These works are still supposed to remain; but as they exceed the power and resources of the present city to keep them in repair, they are quite concealed, except at one or two places. They were in the midst of the Roman greatness, and still are, reckoned among the wonders of the world; and yet they are said to have been works of the elder Tarquin, a prince whose territory did not extend, in any direction, above 16 miles; and, on this supposition, they must have been made to accommodate a city that was calculated chiefly for the reception of cattle, herdsmen, and banditti. Rude nations sometimes execute works of great magnificence, as fortresses and temples, for the purposes of war and superstition; but seldom palaces, and still more seldom works of mere convenience and cleanliness, in which for the most part they are long defective. It is not unreasonable, therefore, to question the authority of tradition in respect to this singular monument of antiquity, which so greatly exceeds what the best accommodated city of modern Europe could undertake for its own conveniency. And as those works are still entire, and may continue so for thousands of years, it may be suspected that they were even prior to the settlement of Romulus, and may have been the remains of a more ancient city, on the ruins of which the followers of Romulus settled, as the Arabs now hut or *Ferguson's Roman History.*

encamp

Sewer, Sex

encamp on the ruins of Palmyra and Balbeck. Livy owns, that the common ſewers were not accommodated to the plan of Rome, as it was laid out in his time; they were carried in directions acroſs the ſtreets, and paſſed under buildings of the greateſt antiquity. This derangement indeed he imputes to the haſty rebuilding of the city after its deſtruction by the Gauls; but haſte, it is probable, would have determined the people to build on their old foundations, or at leaſt not to change them ſo much as to croſs the direction of former ſtreets.

SEX, the property by which any animal is male or female.

Lavater has drawn the following characteriſtic diſtinctions between the male and female of the human ſpecies.

"The primary matter of which women are conſtituted appears to be more flexible, irritable, and elaſtic, than that of man. They are formed to maternal mildneſs and affection; all their organs are tender, yielding, eaſily wounded, ſenſible, and receptible. Among a thouſand females there is ſcarcely one without the generic feminine ſigns; the flexible, the circular, and the irritable.

"They are the counterpart of man, taken out of man, to be ſubject to man; to comfort him like angels, and to lighten his cares. 'She ſhall be ſaved in childbearing, if they continue in faith, and charity, and holineſs, with ſobriety" (1 Tim. ii. 15.). This tenderneſs, this ſenſibility, this light texture of their fibres and organs, this volatility of feeling, render them ſo eaſy to conduct and to tempt; ſo ready of ſubmiſſion to the enterpriſe and power of the man; but more powerful through the aid of their charms than man with all his ſtrength. The man was not firſt tempted, but the woman, afterward the man by the woman. And, not only eaſy to be tempted, ſhe is capable of being formed to the pureſt, nobleſt, moſt ſeraphic virtue; to every thing which can deſerve praiſe or affection. Highly ſenſible of purity, beauty, and ſymmetry, ſhe does not always take time to reflect on internal life, internal death, internal corruption. 'The woman ſaw that the tree was good for food, and that it was pleaſant to the eyes, and a tree to be deſired to make one wiſe, and ſhe took of the fruit thereof.' (Gen. iii. 6.).

"The female thinks not profoundly; profound thought is the power of the man. Women feel more. Senſibility is the power of woman. They often rule more effectually, more ſovereignly, than man. They rule with tender looks, tears, and ſighs; but not with paſſion and threats; for if, or when, they ſo rule, they are no longer women, but abortions. They are capable of the ſweeteſt ſenſibility, the moſt profound emotion, the utmoſt humility, and the exceſs of enthuſiaſm. In their countenance are the ſigns of ſanctity and inviolability, which every feeling man honours, and the effects of which are often miraculous. Therefore, by the irritability of their nerves, their incapacity for deep inquiry and firm deciſion, they may eaſily from their extreme ſenſibility become the moſt irreclaimable, the moſt rapturous enthuſiaſts. Their love, ſtrong and rooted as it is, is very changeable; their hatred almoſt incurable, and only to be effaced by continued and artful flattery. Men are moſt profound; women are more ſublime.

"Men moſt embrace the whole; women remark individually, and take more delight in ſelecting the minutiæ which form the whole. Man hears the burſting thunder, views the deſtructive bolt with ſerene aſpect, and ſtands erect amidſt the fearful majeſty of the ſtreaming clouds. Woman trembles at the lightning, and the voice of diſtant thunder; and ſhrinks into herſelf or ſinks into the arms of man. Man receives a ray of light ſingle, woman delights to view it through a priſm in all its dazzling colours. She contemplates the rainbow as the promiſe of peace; he extends his inquiring eye over the whole horizon. Woman laughs, man ſmiles; woman weeps, man remains ſilent. Woman is in anguiſh when man weeps, and in deſpair when man is in anguiſh; yet has ſhe often more faith than man. Man without religion, is a diſeaſed creature, who would perſuade himſelf he is well, and needs not a phyſician; but woman without religion, is raging and monſtrous. A woman with a beard is not ſo diſguſting as a woman who acts the freethinker; her ſex is formed to piety and religion; to them Chriſt firſt appeared; but he was obliged to prevent them from too ardently, and too haſtily, embracing him: 'Touch me not.' They are prompt to receive and ſeize novelty, and become its enthuſiaſts. The whole world is forgotten in the emotion cauſed by the preſence and proximity of him they love. They ſink into the moſt incurable melancholy, as they alſo riſe to the moſt enraptured heights.

"Male ſenſation is more imagination, female more heart. When communicative, they are more communicative than man; when ſecret, more ſecret. In general they are more patient, long-ſuffering, credulous, benevolent, and modeſt. Woman is not a foundation on which to build. She is the gold, ſilver, precious ſtones, wood, hay, ſtubble (1 Cor. iii. 12.); the materials for building on the male foundation. She is the leaven, or more expreſſively the oil to the vinegar of man: the ſecond part of the book of man.

"Man ſingly is but half man; at leaſt but half human; a king without a kingdom. Woman, who feels properly what ſhe is, whether ſtill or in motion, reſts upon the man; nor is man what he may and ought to be, but in conjunction with woman; therefore, 'it is not good that man ſhould be alone, but that he ſhould leave father and mother, and cleave to his wife, and they two ſhall be one fleſh."

They differ alſo in their exterior form and appearance.

"Man is the moſt firm; woman the moſt flexible. Man is the ſtraighteſt; woman the moſt bending. Man ſtands ſtedfaſt: woman gently retreats. Man ſurveys and obſerves; woman glances and feels. Man is ſerious; woman is gay. Man is the talleſt and broadeſt; woman the ſmalleſt and weakeſt. Man is rough and hard; woman ſmooth and ſoft. Man is brown; woman is fair. Man is wrinkly; woman is not. The hair of man is more ſtrong and ſhort; of woman more long and pliant. The eyebrows of man are compreſſed; of woman leſs frowning. Man has moſt convex lines; woman moſt concave. Man has moſt ſtraight lines; woman moſt curved. The countenance of man taken in profile is more ſeldom perpendicular than that of the woman. Man is moſt angular; woman moſt round."

Sex.

In determining the comparative merit of the two ſexes, it is no derogation from female excellency that it differs in kind from that which diſtinguiſhes the male part of our ſpecies: and if, in general, it ſhould be

Fitzoſborne's Letters.

Sex. found (what upon an impartial inquiry will moſt certainly be found) that women fill up their appointed circle of action with greater regularity than men, the claim of preference cannot juſtly be decided in our favour. In the prudential and economical parts of life, it is undeniable that they riſe far above us: and if true fortitude of mind is beſt diſcovered by a cheerful reſignation to the meaſures of Providence, we ſhall not find reaſon, perhaps, to claim that moſt ſingular of the human virtues as our peculiar privilege. There are numbers of the other ſex who, from the natural delicacy of their conſtitution, paſs through one continued ſcene of ſuffering from their cradles to their graves, with a firmneſs of reſolution that would deſerve ſo many ſtatues to be erected to their memories, if heroiſm were not eſteemed more by the ſplendor than the merit of actions.

But whatever real difference there may be between the moral or intellectual powers of the male and female mind, Nature does not ſeem to have marked the diſtinction ſo ſtrongly as our vanity is willing to imagine; and after all, perhaps, education will be found to conſtitute the principal ſuperiority. It muſt be acknowledged, at leaſt, that in this article we have every advantage over the ſofter ſex that art and induſtry can poſſibly ſecure to us. The moſt animating examples of Greece and Rome are ſet before us, as early as we are capable of any obſervation; and the nobleſt compoſitions of the ancients are given into our hands almoſt as ſoon as we have ſtrength to hold them; while the employments of the other ſex, at the ſame period of life, are generally the reverſe of every thing that can open and enlarge their minds, or fill them with juſt and rational notions. The truth of it is, female education is ſo much worſe than none, as it is better to leave the mind to its natural and uninſtructed ſuggeſtions, than to lead it into falſe purſuits, and contract its views, by turning them upon the loweſt and moſt trifling objects. We ſeem, indeed, by the manner in which we ſuffer the youth of that ſex to be trained, to conſider women agreeably to the opinion of certain Mahometan doctors, and treat them as if we believed they had no ſouls: why elſe are they

> Bred only, and completed to the taſte
> Of luſtful appetence, to ſing, to dance,
> To dreſs, and troul the tongue, and roll the eye.
>
> MILTON.

This ſtrange neglect of cultivating the female mind can hardly be allowed as good policy, when it is conſidered how much the intereſt of ſociety is concerned in the rectitude of their underſtandings. That ſeaſon of every man's life which is moſt ſuſceptible of the ſtrongeſt impreſſions, is neceſſarily under female direction; as there are few inſtances, perhaps, in which that ſex is not one of the ſecret ſprings which regulates the moſt important movements of private or public tranſactions. What Cato obſerves of his countrymen is in one reſpect true of every nation under the ſun: "The Romans (ſaid he) govern the world, but it is the women that govern the Romans."

If it be true then (as true beyond all peradventure it is) that female influence is thus extenſive, nothing certainly can be of more importance than to give it a proper tendency, by the aſſiſtance of a well-directed education. Far are we from recommending any attempts to render women learned; yet ſurely it is neceſſary they ſhould be raiſed above ignorance. Such a general tincture of the moſt uſeful ſciences as may ſerve to free the mind from vulgar prejudices, and give it a reliſh for the rational exerciſe of its powers, might very juſtly enter into a plan of female erudition. That ſex might be taught to turn the courſe of their reflections into a proper and advantageous channel, without any danger of rendering them too elevated for the feminine duties of life. In a word, they ought to be conſidered as deſigned by Providence for uſe as well as ſhow, and trained up, not only as women, but as rational creatures. Sex ‖ Sextius.

SEX of Bees. See BEE.

SEX of Plants. See BOTANY *Index*.

SEXAGENARY, ſomething relating to the number ſixty: thus ſexagenary or ſexageſimal arithmetic is a method of computation proceeding by ſixtics; ſuch is that uſed in the diviſion of a degree into ſixty minutes, of the minute into ſixty ſeconds, of the ſecond into ſixty thirds, &c. Alſo ſexagenary tables are tables of proportional parts, ſhowing the product of two ſexagenaries that are to be multiplied, or the quotient of the two that are to be divided.

SEXAGESIMA, the ſecond Sunday before Lent, or the next to Shrove-Sunday; ſo called as being about the 60th day before Eaſter.

SEXAGESIMALS, or *SEXAGESIMAL Fractions*, fractions whoſe denominators proceed in a ſexagecuple ratio; that is, a prime, or the firſt minute $=\frac{1}{60}$; a ſecond $=\frac{1}{3600}$; a third $=\frac{1}{216000}$. Anciently, there were no other than ſexageſimals uſed in aſtronomy; and they are ſtill retained in many caſes, though decimal arithmetic begins to grow in uſe now in aſtronomical calculations. In theſe fractions, which ſome call *aſtronomical fractions*, the denominator being always 60, or a multiple thereof, is uſually omitted, and the numerator only written down: thus 4^{0}, $59,'$ $32''$, $50'''$, $16''''$, is to be read, 4 degrees, 59 minutes, 32 ſeconds, 50 thirds, 16 fourths, &c.

SEXTANS, SEXTANT, a ſixth part of certain things. The Romans having divided their *as* into 12 ounces or uncia, the ſixth part of that, or two ounces, was the ſextans.—*Sextans* was alſo a meaſure which contained two ounces of liquor, or two cyathi.

SEXTANS, in *Aſtronomy*, a conſtellation of the ſouthern hemiſphere, made by Helvelius out of unformed ſtars. In Hevelius's catalogue it contains 11, but in the Britannic catalogue 41 ſtars.

SEXTANT, in *Mathematics*, denotes the ſixth part of a circle, or an arch comprehending 60 degrees.

The word *ſextant* is more particularly uſed for an aſtronomical inſtrument made like a quadrant, excepting that its limb only comprehends 60 degrees. The uſe and application of the ſextant is the ſame with that of the quadrant. See QUADRANT; and NAVIGATION, p. 699, &c.

SEXTILE, SEXTILIS, the poſition or aſpect of two planets when at 60 degrees diſtance, or at the diſtance of two ſigns from one another. It is marked thus (*). See ASPECT.

SEXTIUS, QUINTUS, a Pythagorean philoſopher, flouriſhed in the time of Auguſtus. He ſeemed formed to riſe in the republic; but he ſhrunk from civil honours, and declined accepting the rank of ſenator when it was offered him by Julius Cæſar, that he might have time

Sextius || Sextus.

time to apply to philoſophy. It appears that he wiſhed to eſtabliſh a ſchool at Rome, and that his tenets, though chiefly drawn from the doctrines of Pythagoras, in ſome particulars reſembled thoſe of the Stoics.

He ſoon found himſelf involved in many difficulties. His laws were tinctured with great ſeverity; and in an early period of this eſtabliſhment, he found his mind ſo haraſſed, and the harſhneſs of the doctrines which he wiſhed to eſtabliſh ſo repulſive to his feelings, that he had nearly worked himſelf up to ſuch an height of deſperation as to reſolve on putting a period to his exiſtence.

Of the ſchool of Sextius were Fabianus, Sotion, Flavianus, Craſſitius, and Celſus. Of his works only a few fragments remain; and whether any of them formed a part of the work which Seneca admired ſo much, cannot now be determined. Some of his maxims are valuable. He recommended an examination of the actions of the day to his ſcholars when they retired to reſt; he taught, that the road to heaven (*ad aſtra*) was by frugality, temperance, and fortitude. He uſed to recommend holding a looking glaſs before perſons diſordered with paſſion. He enjoined his ſcholars to abſtain from animal food.

SEXTON, a church-officer, thus called by corruption of the Latin *ſacriſta*, or Saxon *ſegerſtone*, which denotes the ſame. His office is to take care of the veſſels, veſtments, &c. belonging to the church; and to attend the miniſter, church-warden, &c. at church. He is uſually choſen by the parſon only. Sextons, as well as pariſh clerks, are regarded by the common law as perſons who have freehold in their offices; and, therefore, though they may be puniſhed, yet they cannot be deprived, by eccleſiaſtical cenſures.

The office of ſexton in the pope's chapel is appropriated to the order of the hermits of St Auguſtine. He is generally a biſhop, though ſometimes the pope only gives a biſhopric, *in partibus*, to him on whom he confers the poſt. He takes the title of *Prefect of the Pope's Sacriſty*, and has the keeping the veſſels of gold and ſilver, the relics, &c. When the pope ſays maſs, the ſexton always taſtes the bread and wine firſt. If it be in private he ſays maſs, his holineſs, of two wafers, gives him one to eat; and, if in public, the cardinal, who aſſiſts the pope in quality of deacon, of three wafers, gives him one to eat. When the pope is deſperately ſick, he adminiſters to him the ſacrament of extreme unction, &c. and enters the conclave in quality of firſt conclaviſt.

The office of a ſexton in Sweden is ſometimes ſingular. During M. Outhier's ſtay at Stockholm in 1736 he viſited the church of St Clara, and during divine ſervice he obſerved a ſexton going about with a long rod, waking thoſe perſons who had fallen aſleep.

SEXTUPLE, in *Muſic*, denotes a mixed ſort of triple, which is beaten in double time.

SEXTUS EMPIRICUS, a famous Pyrrhonian philoſopher, lived in the ſecond century, under the reign of Antoninus the Debonair. He was a phyſician of the ſect of the Empirics, and is ſaid to have been one of the preceptors of Antoninus the philoſopher. There are ſtill extant his Pyrrhonian Inſtitutions, and a large work againſt the mathematicians, &c. The beſt edition of Sextus Empiricus is that of Fabricius in Greek and Latin, printed at Leipſic in 1718, folio.

SEXUALISTÆ, among botanical writers, thoſe who have eſtabliſhed the claſſes of plants upon the differences of the ſexes and parts of fructification in plants, according to the modern method; as Linnæus, &c. Sexualiſtæ || Sforza.

SEZAWUL, a Hindoo word, uſed in Bengal to expreſs an officer employed at a monthly ſalary to collect the revenues.

SFORZA, JAMES, was the founder of the illuſtrious houſe of Sforza, which acted ſo conſpicuous a part in Italy during the 15th and 16th centuries, which gave ſix dukes to Milan, and contracted alliances with almoſt every ſovereign in Europe. James Sforza was born on the 28th of May 1369, at Catignola, a ſmall town in Italy, lying between Imola and Faënza. His father was a day labourer, or, according to Commines, a ſhoemaker. A company of ſoldiers happening one day to paſs through Catignola, he was ſeized with the deſire of accompanying them to the wars. "I will go (ſaid he to himſelf), and dart my hatchet againſt that tree, and if it ſtick faſt in the wood, I will immediately become a ſoldier." The hatchet accordingly ſtuck faſt, and our adventurer enliſted; and becauſe, ſays the Abbé de Choiſi, he had thrown the axe with all his force, he aſſumed the name of Sforza; for his true name was Giacomuzzo, or James Attendulo. He roſe rapidly in the army, and ſoon became commander of 7000 men. He defended the cauſe of Jane II. queen of Naples for many years, and was made conſtable of her kingdom. He was created Count of Catignola by Pope John XXII. by way of paying a debt of 14000 ducats which the church of Rome owed him. His exploits became every day more illuſtrious: He obliged Alphonſo king of Arragon to raiſe the ſiege of Naples; and reduced ſeveral places that had revolted in Abruzzo and Le Labour; but while in purſuit of his enemies he was unfortunately drowned in the river Aterno on the 3d January 1424, at the age of 54 years. His heroic qualities, and the continual wars in which he was engaged, did not prevent him from forming an attachment to the fair ſex. In his youth he fell in love with a woman called *Lucia Trezana*, whom he married after ſhe had born him ſeveral children. He married afterwards Antoinette Salembini, who brought him ſeveral excellent eſtates; ſhe bore him Boſio Sforza, compte of Santa-Flor, a warrior and governor of Orvietta for Pope Martin V. His third wife was Catharine Alopo, ſiſter of Rodolpho, grand chamberlain to the ſovereign of Naples. His laſt wife, for he was four times married, was Mary Marzana, daughter to the duke of Seſſa. She bore him Charles Sforza, who was general of the order of Auguſtines, and archbiſhop of Milan.

SFORZA, *Francis*, the ſon of James Sforza by Lucia Trezana, was born in 1401, and trained up by his father to the profeſſion of arms. At the age of 23 he defeated the troops of Braccio, who diſputed with him the paſſage of the Aterno. In this action his father was drowned, and Francis, though illegitimate, ſucceeded him. He fought ſucceſsfully againſt the Spaniards, and contributed a great deal both towards raiſing the ſiege of Naples, and to the victory which was gained over the troops of Braccio near Aquila in 1425, where that general was killed. After the death of Queen Jane, in 1435, he eſpouſed the intereſts of the duke of Anjou, to whom ſhe had left her crown, and by his courage and abilities ably ſupported that unfortunate

Sforza II Shadow.

fortunate prince. He made himſelf maſter of ſeveral places in Ancona, from which he was driven by Pope Eugenius IV. who defeated and excommunicated him; but he ſoon re-eſtabliſhed his affairs by a victory. His reputation was now ſo great, that the pope, the Venetians, and the Florentines, choſe him for their general againſt the duke of Milan. Sforza had already conducted Venetian armies againſt that prince, though he had eſpouſed his daughter. The duke dying in 1447, the inhabitants of Milan invited Sforza, his ſon-in-law, to lead them againſt that duke. But, after ſome exertions in their favour, he turned his arms againſt themſelves, laid ſiege to Milan, and obliged them to receive him as duke, notwithſtanding the rights of Charles duke of Orleans, the ſon of Valentine of Milan. In 1464, Louis XI. who hated Orleans, gave up to Sforza the rights which the crown of France had over Genoa, and even put into his hands Savona, a town belonging to that republic. The duke of Milan ſoon after made himſelf maſter of Genoa. He died in 1466, with the reputation of a man who was willing to ſell his blood to the beſt purchaſer, and who was not too ſcrupulous an obſerver of his word. His ſecond wife was Blanche Marie, natural daughter of Philip Marie duke of Milan. She bore him Galeas Marie, and Ludovic Marie, dukes of Milan, Philip Marie count of Pavia, Sforza Marie duke of Bari, Aſcagne Marie biſhop of Pavia and Cremona, and a cardinal. He was taken priſoner by the troops of Louis XII. and confined for ſome time in the tower of Bourges. He was a cunning man, and deceived Cardinal d'Amboiſe when that prelate aſpired at the papacy. His daughters were Hyppolita, married to Alphonſo of Arragon, afterwards king of Naples; and Elizabeth, married to William marquis of Montferrat. He had beſides ſeveral natural children.

SHACK, in ancient cuſtoms, a liberty of winter-paſturage. In the counties of Norfolk and Suffolk, the lord of the manor has ſhack, i. e. a liberty of feeding his ſheep at pleaſure in his tenants lands during the ſix winter months. In Norfolk, ſhack alſo extends to the common for hogs, in all men's grounds, from the end of harveſt till ſeed-time. Whence to go *a-ſhack*, is to feed at large.

SHACKLES, aboard a ſhip, are thoſe oblong iron rings, bigger at one end than at the other, with which the ports are ſhut faſt, by thruſting the wooden bar of the port through them. There is alſo a ſort of ſhackles to lift the hatches up with, of a like figure, but ſmaller. They are faſtened at the corners of the hatches.

SHAD, a ſpecies of CLUPEA. See ICHTHYOLOGY *Index*.

SHADDOCK, a ſpecies of CITRUS, the fruit of which is of a very large ſize, and of a very grateful taſte. In the Weſt Indies it is eaten after dinner to give a zeſt to the wine.

SHADOW, in *Optics*, a privation or diminution of light, by the interpoſition of an opaque body; or it is a plane where the light is either altogether obſtructed, or greatly weakened, by the interpoſition of ſome opaque body between it and the luminary.

SHADOW, in *Painting*, an imitation of a real ſhadow, effected by gradually heightening and darkening the colours of ſuch figures as by their diſpoſitions cannot receive any direct rays from the luminary that is ſuppoſed to enlighten the piece.

Shadow, Shadows.

SHADOW, in *Perſpective*, the appearance of an opaque body, and a luminous one, whoſe rays diverge (*e. gr.* a candle, lamp, &c.), being given; to find the juſt appearance of the ſhadow, according to the laws of perſpective. The method is this: From the luminous body, which is here conſidered as a point, let fall a perpendicular to the perſpective plane or table; i. e. find the appearance of a point upon which a perpendicular, drawn from the middle of the luminary, falls on the perſpective plane; and from the ſeveral angles, or raiſed points of the body, let fall perpendiculars to the plane. Theſe points, whereon the perpendiculars fall, connect by right lines, with the point upon which the perpendicular let fall from the luminary falls; and continue the lines to the ſide oppoſite to the luminary. Laſtly, through the raiſed points draw lines through the centre of the luminary, interſecting the former; the points of interſection are the terms or bounds of the ſhadow.

SHADOWS, COLOURED, a curious phenomenon in optics, which was obſerved by Profeſſor Scherffer of Vienna, and afterwards by Count Rumford, who made the diſcovery while proſecuting his experiments on light.

"Deſirous," ſays the count, "of comparing the intenſity of the light of a clear blue ſky by day with that of a common wax candle, I darkened my room, and letting the day-light from the north, coming through a hole near the top of the window-ſhutter, fall at an angle of about 70° upon a ſheet of very fine white paper, I placed a burning wax candle in ſuch a poſition that its rays fell upon the ſame paper, and, as near as I could gueſs, in the line of reflection of the rays of day-light from without; when, interpoſing a cylinder of wood, about half an inch in diameter, before the centre of the paper, and at the diſtance of about 2 inches from its ſurface, I was much ſurpriſed to find that the two ſhadows projected by the cylinder upon the paper, inſtead of being merely ſhades without colour, as I expected; the one of them, that which, correſponding with the beam of day-light, was illuminated by the candle, was yellow; while the other, correſponding to the light of the candle, and conſequently illuminated by the light of the heavens, was of the moſt beautiful blue that it is poſſible to imagine. This appearance, which was not only unexpected, but was really in itſelf in the higheſt degree ſtriking and beautiful, I found upon repeated trials, and after varying the experiment in every way I could think of, to be ſo perfectly permanent, that it is abſolutely impoſſible to produce two ſhadows at the ſame time, from the ſame body, the one anſwering to a beam of day-light, and the other to the light of a candle or lamp, without thoſe ſhadows being coloured, the one yellow, and the other blue.

"If the candle be brought nearer to the paper, the blue ſhadow will become of a deeper hue, and the yellow ſhadow will gradually grow fainter; but if it be removed farther off, the yellow ſhade will become of a deeper colour, and the blue ſhade will become fainter; and the candle remaining ſtationary in the ſame place, the ſame varieties in the ſtrength of the tints of the coloured ſhadows may be produced merely by opening the window-ſhutter a little more or leſs, and rendering the illumination of the paper, by the light from without, ſtronger or weaker. By either of theſe means, the coloured ſhadows may be made to paſs through all the gradations of ſhade, from the deepeſt to the lighteſt, and *vice*

Shadows || Shafras.

vice verſa; and it is not a little amuſing to ſee ſhadows thus glowing with all the brilliancy of the pureſt and moſt intenſe priſmatic colours, then paſſing ſuddenly through all the varieties of ſhade, preſerving in all the moſt perfect purity of tint, growing ſtronger and fainter, and vaniſhing and returning, at command *."

* *Phil. Tranſ.* 1794.

The count is clearly of opinion, that the cauſes of the colours of theſe ſhadows ariſe from the different qualities of the light by which they are illuminated; but he does not think it ſo evident how they are produced. Perhaps it may be ſaid, however, that all the phenomena of coloured ſhadows which the count enumerates may be accounted for by the theory of Profeſſor Scherffer.

SHADWELL, THOMAS, deſcended of an ancient family in Staffordſhire, was born in 1640, and educated at Caius college, Cambridge. He then was placed in the Middle Temple to ſtudy the laws; where having ſpent ſome time, he travelled abroad. Upon his return home, he became acquainted with the moſt celebrated perſons of wit in that age. He applied himſelf chiefly to dramatic writing, in which he had great ſucceſs; and upon the revolution was made poet laureat and hiſtoriographer to King William and Queen Mary, in the room of Mr Dryden. Theſe employments he enjoyed till his death, which happened in 1692. Beſide his dramatic writings, he compoſed ſeveral other pieces of poetry; the chief of which are his congratulatory poem on the prince of Orange's coming to England; another on Queen Mary; his tranſlation of Juvenal's 10th ſatire, &c. Mr Dryden treats him with great contempt, in his ſatire called *Mac-Flecno*. The beſt judges of that age, however, gave their teſtimony in favour of his comedies; which have in them fine ſtrokes of humour; the characters are often original, ſtrongly marked, and well ſuſtained. An edition of his works, with ſome account of his life and writings prefixed, was publiſhed in 1720, in 4 vols 8vo.

SHAFRAS, or SUFFRAS, GREGORY SAVAROF, an Armenian merchant, remarkable only as the perſon who ſold the large and celebrated diamond which is now ſet in the imperial ſceptre of Ruſſia. Shah Nadir, an Indian prince, had two principal diamonds in his throne, one of them denominated the *Sun of the Sea*, and the other the *Moon of the Mountain*. When that prince was aſſaſſinated, many precious ornaments belonging to the crown were pillaged, and privately diſpoſed of by the ſoldiers who ſhared the plunder. See DIAMOND, under MINERALOGY, where the account given of this diamond is ſomewhat different.

Shafras, who was called *Millionſhik* at Aſtracan, then had his reſidence at Baſſora, with two of his brothers. A chief of the Avganians one day applied to him, and propoſed to ſell the diamond already mentioned for a very moderate ſum (probably the Moon of the Mountain), together with a very large emerald, a ruby of conſiderable ſize, and other precious ſtones of leſs value. Shafras was aſtoniſhed at the offer; and giving out that he had not a ſufficient ſum to purchaſe them, he requeſted time to conſult with his brothers on the ſubject. The vender did not again make his appearance, probably from ſuſpicious motives. Shafras, with the approbation of his brothers, went directly in ſearch of the ſtranger with the jewels, but by that time he had left Baſſora. Shafras, however, accidentally met him at Bagdad, and paid him 50,000 piaſtres (8958*l.* 6*s.* 8*d.*) for all his jewels. Shafras and his brothers being well aware that the moſt profound ſecrecy was abſolutely neceſſary, reſolved to remain at Baſſora. Shafras || Shafteſbury

At the expiration of 12 years, Shafras ſet off with the largeſt of the jewels, directing his route through Sham and Conſtantinople, and afterwards through Hungary and Sileſia to the city of Amſterdam by land, where he publicly offered them for ſale.

It is reported that the Britiſh government was among the bidders. The Ruſſian court ſent for the large diamond, with an offer to reimburſe all reaſonable expences, if the price could not be agreed on. When the diamond arrived, Count Panin, the Ruſſian miniſter, made the following offer to Shafras. Beſides the patent of hereditary nobility, which the vender demanded, he was to receive an annual penſion of 6000 rubles during life, 500,000 rubles in caſh (112,500*l.* Sterling), one-fifth of which was to be payable on demand, and the remainder by inſtalments in the courſe of ten years. He alſo claimed the order of nobility for his brothers, perſiſting ſo obſtinately in his demands, that the diamond was returned.

Shafras was now very much perplexed. He had involved himſelf in expences, was forced to pay intereſt for conſiderable ſums of borrowed money, and he ſaw no proſpect of ſelling the jewel to advantage. The negociation was recommenced with Ruſſia by Count Gregory Grigorievitſh Orlof, afterwards created a prince of the empire; and the diamond was purchaſed for 450,000 rubles (105,250*l.*) ready money, together with a grant of Ruſſian nobility. We are informed that 120,000 rubles (27,000*l.*), fell to the ſhare of the negociators, for commiſſion, intereſt, and ſimilar expences. Shafras ſettled at Aſtracan; and his riches, which by inheritance devolved to his daughters, have been in a great meaſure diſſipated by the extravagance of his ſons-in-law.

SHAFT *of a* COLUMN, in *Building*, is the body thereof between the baſe and capital; ſo called from its ſtraightneſs. See ARCHITECTURE.

SHAFT, in mining, is the pit or hollow entrance into the mine. In the tin mines, after this is ſunk about a fathom, they leave a little, long, ſquare place, which is called a *ſhamble*.

Shafts are ſunk ſome ten, ſome twenty fathoms deep into the earth, more or leſs. Of theſe ſhafts, there is the landing or working ſhaft, where they bring up the work or ore to the ſurface; but if it be worked by a horſe engine or whim, it is called a *whim-ſhaft;* and where the water is drawn out of the mine, it is indifferently named an *engine-ſhaft*, or the *rod-ſhaft*. See MINE.

SHAFT. See TROCHILUS, ORNITHOLOGY *Index*.

SHAFTESBURY, a town of Dorſetſhire in England, in W. Long. 2. 20. N. Lat. 51. 0. It ſtands on a high hill, and is built in the form of a bow. It enjoys a ſerene wholeſome air, and has a fine proſpect. It is a good thoroughfare, is governed by a mayor, and ſends two members to parliament. This town is ſuppoſed to have been built in the 8th century, and to have been enlarged by King Alfred; and had 12 churches, beſides a Benedictine monaſtery, in the time of the Saxons, but has now only three. St Edward the martyr was buried here. It had three mints before the conqueſt, and, in the reign of Henry VIII. was the ſee of a ſuffragan

Shaftesbury || Shagreen.

fragan biſhop. It was incorporated by Queen Elizabeth and Charles II. and is governed by a mayor, recorder, twelve aldermen, bailiffs, and a common-council. It contains about 320 houſes, many of which are of free-ſtone. Water is ſo ſcarce, that it uſed to be ſupplied from Motcomb; but it was obtained more commodiouſly in 1718, by means of engines, which raiſed the water above 300 feet perpendicular, and conveyed it to a large ciſtern in the middle of the town, from the diſtance of two miles. Yet even this is laid aſide, and they have dug ſeveral pits, in which they preſerve the rain-water; and the poor get their living to this day by fetching it in pails or on horſes. It gives the title of earl to the noble family of Cooper.

SHAFTESBURY, *Earl of.* See COOPER.

SHAG. See PELICANUS, ORNITHOLOGY *Index.*

SHAGREEN, or CHAGREEN, in *Commerce*, a kind of grained leather prepared of the ſkin of a ſpecies of SQUALUS, and much uſed in covering caſes, books, &c.

The beſt is that brought from Conſtantinople, of a browniſh colour; the white is the worſt. It is extremely hard; yet, when ſteeped in water, it becomes very ſoft and pliable; whence it is of great uſe among caſe makers. It takes any colour that is given it, red, green, yellow, or black. It is frequently counterfeited by morocco, formed like ſhagreen; but this laſt is diſtinguiſhed by its peeling off, which the firſt does not.

The following is the method of preparing ſhagreen, as it is deſcribed by Profeſſor Pallas.

"All kinds of horſes or aſſes ſkins, which have been dreſſed in ſuch a manner as to appear grained, are, by the Tartars, called *ſauwer*, by the Perſians *ſogre*, and by the Turks *ſogri*, from which the Europeans have made *ſhagreen* or *chagrin*. The Tartars who reſide at Aſtracan, with a few of the Armenians of that city, are the only people in the Ruſſian empire acquainted with the art of making ſhagreen. Thoſe who follow this occupation not only gain conſiderable profit by the ſale of their production to the Tartars of Cuban, Aſtrâcan, and Caſan, who ornament with it their Turkey leather boots, ſlippers, and other articles made of leather, but they derive conſiderable advantage from the great ſale of horſes hides, which have undergone no other proceſs than that of being ſcraped clean, and of which ſeveral thouſands are annually exported, at the rate of from 75 to 85 roubles per hundred, to Perſia, where there is a ſcarcity of ſuch hides, and from which the greater part of the ſhagreen manufactured in that country is prepared. The hind part only of the hide, however, which is cut out in the form of a creſcent about a Ruſſian ell and a half in length acroſs the loins, and a ſhort ell in breadth along the back, can properly be employed for ſhagreen. The remaining part, as is proved by experience, is improper for that purpoſe, and is therefore rejected.

"The preparation of the ſkins, after being cut into the above form, is as follows:—They are depoſited in a tub filled with pure water, and ſuffered to remain there for ſeveral days, till they are thoroughly ſoaked, and the hair has dropped off. They are then taken from the tub, one by one, extended on boards placed in an oblique direction againſt a wall, the corners of them, which reach beyond the edges of the board, being made faſt, and the hair with the epidermis is then ſcraped off with a blunt iron ſcraper called *urak*. The ſkins thus cleaned are again put in pure water to ſoak. When all the ſkins have undergone this part of the proceſs, they are taken from the water a ſecond time, ſpread out one after the other as before, and the fleſh ſide is ſcraped with the ſame kind of inſtrument. They are carefully cleaned alſo on the hair ſide, ſo that nothing remains but the pure fibrous tiſſue, which ſerves for making parchment, conſiſting of coats of white medullary fibres, and which has a reſemblance to a ſwine's bladder ſoftened in water. Shagreen.

"After this preparation, the workmen take a certain kind of frames called *pälzi*, made of a ſtraight and a ſemicircular piece of wood, having nearly the ſame form as the ſkins. On theſe the ſkins are extended in as ſmooth and even a manner as poſſible by means of cords; and during the operation of extending them, they are ſeveral times beſprinkled with water, that no part of them may be dry, and occaſion an unequal tenſion. After they have been all extended on the frames, they are again moiſtened, and carried into the houſe, where the frames are depoſited cloſe to each other on the floor with the fleſh ſide of the ſkin next the ground. The upper ſide is then thickly beſtrewed with the black exceedingly ſmooth and hard ſeeds of a kind of gooſe foot (*chenopodium album*), which the Tartars call *alabuta*, and which grows in abundance, to about the height of a man, near the gardens and farms on the ſouth ſide of the Volga; and that they may make a ſtrong impreſſion on the ſkins, a piece of felt is ſpread over them, and the ſeeds are trod down with the feet, by which means they are deeply imprinted into the ſoft ſkins. The frames, without ſhaking the ſeeds, are then carried out into the open air, and placed in a reclining poſition againſt a wall to dry, the ſide covered with the ſeeds being next the wall, in order that it may be ſheltered from the ſun. In this ſtate the ſkins muſt be left ſeveral days to dry in the ſun, until no appearance of moiſture is obſerved in them, when they are fit to be taken from the frames. When the impreſſed ſeeds are beat off from the hair ſide, it appears full of indentations or inequalities, and has acquired that impreſſion which is to produce the grain of the ſhagreen, after the ſkins have been ſubjected to the laſt ſmoothing or ſcraping, and have been dipped in a ley, which will be mentioned hereafter, before they receive the dye.

"The operation of ſmoothing is performed on an inclined bench or board, which is furniſhed with an iron hook, and is covered with thick felt of ſheep's wool, on which the dry ſkin may gently reſt. The ſkin is ſuſpended in the middle of the bench or board to its iron hook, by means of one of the holes made in the edge of the ſkin for extending it in its frame as before mentioned; and a cord, having at its extremity a ſtone or a weight, is attached to each end of the ſkin, to keep it in its poſition while under the hands of the workman. It is then ſubjected to the operation of ſmoothing and ſcraping by means of two different inſtruments. The firſt uſed for this purpoſe, called by the Tartars *tokar*, is a piece of ſharp iron bent like a hook, with which the ſurface of the ſhagreen is pretty cloſely ſcraped to remove all the projecting inequalities.

This

Shagreen. This operation, on account of the corneous hardneſs of the dry ſkin, is attended with ſome difficulty; and great caution is at the ſame time required that too much of the impreſſion of the *alabuta* ſeed be not deſtroyed, which might be the caſe if the iron were kept too ſharp. As the iron, however, is pretty blunt, which occaſions inequalities on the ſhagreen, this inconvenience muſt afterwards be remedied by means of a ſharp ſcraping iron or *urak*, by which the ſurface acquires a perfect uniformity, and only faint impreſſions of the *alabuta* ſeed then remain, and ſuch as the workman wiſhes. After all theſe operations, the ſhagreen is again put into water, partly to make it pliable, and partly to raiſe the grain. As the ſeeds occaſion indentations on the ſurface of the ſkin, the intermediate ſpaces, by the operations of ſmoothing and ſcraping, loſe ſome part of their projecting ſubſtance; but the points which have been depreſſed, and which have loſt none of their ſubſtance, now ſwell up above the ſcraped parts, and thus form the grain of the ſhagreen. To produce this effect, the ſkins are left to ſoak in water for 24 hours; after which they are immerſed ſeveral times in a ſtrong warm ley, obtained, by boiling, from a ſtrong alkaline earth named *ſchora*, which is found in great abundance in the neighbourhood of Aſtracan. When the ſkins have been taken from this ley, they are piled up, while warm, on each other, and ſuffered to remain in that ſtate ſeveral hours; by which means they ſwell, and become ſoft. They are then left 24 hours in a moderately ſtrong pickle of common ſalt, which renders them exceedingly white and beautiful, and fit for receiving any colour. The colour moſt uſual for theſe ſkins is a ſea-green; but old experienced workmen can dye them blue, red, or black, and even make white ſhagreen.

"For the green colour nothing is neceſſary but filings of copper and ſal ammoniac. Sal ammoniac is diſſolved in water till the water is completely ſaturated; and the ſhagreen ſkins, ſtill moiſt, after being taken from the pickle, are waſhed over with the ſolution on the ungrained fleſh ſide, and when well moiſtened a thick layer of copper filings is ſtrewed over them: the ſkins are then folded double, ſo that the ſide covered with the filings is innermoſt. Each ſkin is then rolled up in a piece of felt; the rolls are all ranged together in proper order, and they are preſſed down in an uniform manner by ſome heavy bodies placed over them, under which they remain 24 hours. During that period, the ſolution of ſal ammoniac diſſolves a quantity of the cupreous particles ſufficient to penetrate the ſkin, and to give it a ſea-green colour. If the firſt application be not ſufficient, the proceſs is repeated in the ſame manner; after which the ſkins are ſpread out and dried.

"For the blue dye, indigo is uſed. About two pounds of it, reduced to a fine powder, are put into a kettle; cold water is poured over it, and the mixture is ſtirred round till the colour begins to be diſſolved. Five pounds of pounded *alakar*, which is a kind of barilla or crude ſoda, prepared by the Armenians and Calmucs, is then diſſolved in it, with two pounds of lime and a pound of pure honey, and the whole is kept ſeveral days in the ſun, and during that time frequently ſtirred round. The ſkins intended to be dyed blue muſt be moiſtened only in the natrous ley *ſchora*, but not in the ſalt brine. When ſtill moiſt, they are folded up and ſewed together at the edge, the fleſh ſide being innermoſt, and the ſhagreened hair ſide outwards; after which they are dipped three times in the remains of an exhauſted kettle of the ſame dye, the ſuperfluous dye being each time expreſſed; and after this proceſs they are dipped in the freſh dye prepared as above, which muſt not be expreſſed. The ſkins are then hung up in the ſhade to dry; after which they are cleaned and paired at the edges. Shagreen.

"For black ſhagreen, gall nuts and vitriol are employed in the following manner:—The ſkins, moiſt from the pickle, are thickly beſtrewed with finely pulverized gall nuts. They are then folded together, and laid over each other for 24 hours. A new ley, of bitter ſaline earth or *ſchora*, is in the mean time prepared, and poured hot into ſmall troughs. In this ley each ſkin is ſeveral times dipped; after which they are again beſtrewed with pounded gall-nuts, and placed in heaps for a certain period, that the galls may thoroughly penetrate them, and they are dried and beat, to free them from the duſt of the galls. When this is done, they are rubbed over, on the ſhagreen ſide, with melted ſheep's tallow, and expoſed a little in the ſun, that they may imbibe the greaſe. The ſhagreen makers are accuſtomed alſo to roll up each ſkin ſeparately, and to preſs or ſqueeze it with their hands againſt ſome hard ſubſtance, in order to promote the abſorption of the tallow. The ſuperfluous particles are removed by means of a blunt wooden ſcraper (*uraс*); and when this proceſs is finiſhed, and the ſkins have lain ſome time, a ſufficient quantity of vitriol of iron is diſſolved in water, with which the ſhagreen is moiſtened on both ſides, and by this operation it acquires a beautiful black dye. It is then dreſſed at the edges, and in other places where there are any blemiſhes.

"To obtain white ſhagreen, the ſkins muſt firſt be moiſtened on the ſhagreen ſide with a ſtrong ſolution of alum. When the ſkin has imbibed this liquor, it is daubed over on both ſides with a paſte made of flour, which is ſuffered to dry. The paſte is then waſhed off with alum water, and the ſkin is placed in the ſun till it is completely dry. As ſoon as it is dry, it is gently beſmeared with pure melted ſheep's tallow, which it is ſuffered to imbibe in the ſun; and to promote the effect, it is preſſed and worked with the hands. The ſkins are then faſtened in ſucceſſion to the before-mentioned bench, where warm water is poured over them, and the ſuperfluous fat is ſcraped off with a blunt wooden inſtrument. In the laſt operation the warm water is of great ſervice. In this manner ſhagreen perfectly white is obtained, and nothing remains but to pare the edges and dreſs it.

"But this white ſhagreen is not intended ſo much for remaining in that ſtate, as for receiving a dark red dye; becauſe, by the above previous proceſs, the colour becomes much more perfect. The ſkins deſtined for a red colour muſt not be immerſed firſt in ley of bitter ſalt earth (*ſchora*), and then in pickle, but after they have been whitened, muſt be left to ſoak in the pickle for 24 hours. The dye is prepared from cochineal, which the Tartars call *kirmiz*. About a pound of the dried herb *tſchagann*, which grows in great abundance in the neighbourhood of Aſtracan, and is a kind

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of ſoda plant or kali (*ſalſola ericoides*) (A), is boiled a full hour in a kettle containing about four common pailfuls of water; by which means the water acquires a greeniſh colour. The herb is then taken out, and about half a pound of pounded cochineal is put into the kettle, and the liquor is left to boil a full hour, care being taken to ſtir it that it may not run over. About 15 or 20 drams of a ſubſtance which the dyers call *liter* (orchilla) is added, and when the liquor has been boiled for ſome time longer, the kettle is removed from the fire. The ſkins taken from the pickle are then placed over each other in troughs, and the dye-liquor is poured over them four different times, and rubbed into them with the hands, that the colour may be equally imbibed and diffuſed. The liquor each time is expreſſed; after which they are fit for being dried. Skins prepared in this manner are ſold at a much dearer rate than any of the other kinds."

SHAIK properly ſignifies an old man. In the eaſt it is uſed to denote a lord or chief, a man of eminence and property. See SCHEICHS.

SHAKE, in ſinging. See TRILL.

SHAKESPEARE or SHAKSPEARE, *William*, the prince of dramatic writers, was born at Stratford upon Avon in Warwickſhire, on the 23d of April 1564. From the regiſter of that town, it appears that a plague broke out there on the 30th of June following, which raged with great violence; but fortunately it did not reach the houſe in which this infant prodigy lay. His father, John Shakeſpeare, enjoyed a ſmall patrimonial eſtate, and was a conſiderable dealer in wool; his mother was the daughter and heir of Robert Arden of Wellingcote. Our illuſtrious poet being deſigned for the buſineſs of his father, received no better education than the inſtructions which the free-ſchool of Stratford could afford. After applying ſome time to the ſtudy of Latin, he was called home to aſſiſt his father, who ſeems by ſome accident to have been reduced in his circumſtances. Before arriving at the age of 19, he married the daughter of Mr Hathaway, a ſubſtantial yeoman in the neighbourhood of Stratford. This lady was eight years older than her huſband. Having the misfortune to fall into bad company, he was ſeduced into ſome profligate actions, which drew on him a criminal proſecution, and at length forced him to take refuge in the capital. In concert with his aſſociates, he broke into a park belonging to Sir Thomas Lucy of Charlecote, and carried off ſome of his deer. Every admirer of Shakeſpeare will regret that ſuch a blemiſh ſhould have ſtained his character; but, perhaps, if any thing can extenuate his guilt, we might aſcribe it to the opinions of the age, which, perhaps, as was formerly the caſe in Scotland, might not diſtinguiſh the killing of deer by any mark of diſgrace, or any charge of criminality. One thing at leaſt is certain, that Shakeſpeare himſelf thought that the proſecution which Sir Thomas raiſed againſt him was carried on with too great ſeverity; an opinion which he could not have entertained had this action been at that time viewed in the ſame criminal light as it is at preſent. Shakeſpeare teſtified his reſentment againſt Sir Thomas, by writing a ſatirical ballad, which exaſperated him ſo much, that the proceſs was carried on with redoubled violence; and the young poet, in order to avoid the puniſhment of the law, was obliged to make his eſcape. This ballad would be conſidered as a curious relick, on account of its being the firſt production of Shakeſpeare; it would alſo be intereſting to peruſe a poem which could irritate the baronet to ſo high a degree. Tradition has preſerved the firſt ſtanza:

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A parliamente member, a juſtice of peace,
At home a poor ſcare-crow, at London an aſſe.
If lowſie is Lucy, as ſome volke miſcalle it,
Then Lucy is lowſie whatever befall it:
He thinks himſelf greate,
Yet an aſſe in his ſtate,
We allowe by his ears, but with aſſes to mate.
If Lucy is lowſie, as ſome volke miſcalle it,
Sing lowſie Lucy whatever befall it.

If the reſt of the ballad was of a piece with this ſtanza, it might aſſiſt us to form ſome opinion of the irritability of the baronet, but will enable us to form no idea of the opening genius of Shakeſpeare.

Thus expelled from his native village, he repaired to London, where he was glad to accept a ſubordinate office in the theatre. It has been ſaid that he was firſt engaged, while the play was acting, in holding the horſes of thoſe who rode to the theatre; but this ſtory reſts on a ſlender foundation. As his name is found printed among thoſe of the other players before ſome old plays, it is probable that he was ſome time employed as an actor; but we are not informed what characters he played; we are only told, that the part which he acted beſt was that of the Ghoſt in Hamlet; and that he appeared in the character of Adam in *As you like it*. If the names of the actors prefixed to Ben Jonſon's play of *Every Man in his Humour* were arranged in the ſame order as the perſons repreſented, which is very probable, Shakeſpeare played the part of Old Knowell. We have reaſon therefore to ſuppoſe, as far as we can argue from theſe few facts, that he generally repreſented old men. See Malone's Chronology, in his edition of Shakeſpeare.

But though he was not qualified to ſhine as an actor, he was now in the ſituation which could moſt effectually rouſe thoſe latent ſparks of genius which afterwards burſt forth with ſo reſplendent a flame. Being well acquainted with the mechanical buſineſs of the theatre and the taſte of the times; poſſeſſed of a knowledge of the characters of men reſembling intuition, an imagination that ranged at large through nature, ſelecting the grand, the ſublime, and the beautiful; a judicious caution, that diſpoſed him to prefer thoſe plots which had already been found to pleaſe; an uncommon fluency

(A) The beautiful red Turkey leather is dyed with cochineal prepared in the ſame manner. Profeſſor Gmelin junior, in the ſecond part of his Travels through Ruſſia, explains the herb *tſchagann* by *artemiſia annua*, having doubtleſs been deceived by the appearance the plant acquires after it has been dried. Beſides, this *artemiſia* is found only in the middle of Siberia, and never on the weſt ſide of the Irtiſch.

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fluency and force of expreſſion; he was qualified at once to eclipſe all who had gone before him.

Notwithſtanding the unrivalled genius of Shakeſpeare, moſt of his plots were the invention of others; which, however, he certainly much improved, if he did not entirely new-model. We are aſſured, that prior to the theatrical compoſitions of Shakeſpeare, dramatic pieces were written on the following ſubjects, viz. King John, King Richard II. and III. King Henry IV. and V. King Henry VIII. King Lear, Antony and Cleopatra, Meaſure for Meaſure, the Merchant of Venice, the Taming of a Shrew, and the Comedy of Errors.

Among his patrons, the earl of Southampton is particularly honoured by him, in the dedication of two poems, Venus and Adonis, and Lucrece; in the latter eſpecially, he expreſſed himſelf in ſuch terms as gives countenance to what is related of that patron's diſtinguiſhed generoſity to him. In the beginning of King James I.'s reign (if not ſooner) he was one of the principal managers of the playhouſe, and continued in it ſeveral years afterwards; till, having acquired ſuch a fortune as ſatisfied his moderate wiſhes and views in life, he quitted the ſtage, and all other buſineſs, and paſſed the remainder of his time in an honourable eaſe, at his native town of Stratford, where he lived in a handſome houſe of his own purchaſing, to which he gave the name of *New Place;* and he had the good fortune to ſave it from the flames in the dreadful fire that conſumed the greateſt part of the town in 1614.

In the beginning of the year 1616, he made his will, wherein he teſtified his reſpect to his quondam partners in the theatre: he appointed his youngeſt daughter, jointly with her huſband, his executors, and bequeathed to them the beſt part of his eſtate, which they came into the poſſeſſion of not long after. He died on the 23d of April following, being the 53d year of his age; and was interred among his anceſtors on the north ſide of the chancel, in the great church of Stratford, where there is a handſome monument erected for him, inſcribed with the following elegiac diſtich in Latin:

Judicio Pylium, genio Socratem, arte Maronem,
Terra tegit, Populus mæret, Olympus habet.

In the year 1740, another very noble one was raiſed to his memory, at the public expence, in Weſtminſter abbey; an ample contribution for this purpoſe being made upon exhibiting his tragedy of Julius Cæſar, at the theatre-royal in Drury-Lane, April 28th 1738.

Nor muſt we omit mentioning another teſtimony of the veneration paid to his manes by the public in general, which is, that a mulberry-tree planted upon his eſtate by the hands of this revered bard, was cut down not many years ago; and the wood being converted to ſeveral domeſtic uſes, was all eagerly bought at a high price, and each ſingle piece treaſured up by its purchaſer as a precious memorial of the planter.

The character of Shakeſpeare as a dramatic writer has been often drawn, but perhaps never with more accuracy than by the pen of Dr Johnſon: "Shakeſpeare (ſays he) is above all writers, at leaſt above all modern writers, the poet of nature; the poet that holds up to his readers a faithful mirror of manners and of life. His characters are not modified by the cuſtoms of particular places, unpractiſed by the reſt of the world; by the peculiarities of ſtudies or profeſſions, which can operate but upon ſmall numbers; or by the accidents of tranſient faſhions or temporary opinions: they are the genuine progeny of common humanity, ſuch as the world will always ſupply, and obſervation will always find. His perſons act and ſpeak by the influence of thoſe general paſſions and principles by which all minds are agitated, and the whole ſyſtem of life is continued in motion. In the writings of other poets, a character is too often an individual; in thoſe of Shakeſpeare, it is commonly a ſpecies.

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"It is from this wide extenſion of deſign that ſo much inſtruction is derived. It is this which fills the plays of Shakeſpeare with practical axioms and domeſtic wiſdom. It was ſaid of Euripides, that every verſe was a precept; and it may be ſaid of Shakeſpeare, that from his works may be collected a ſyſtem of civil and economical prudence. Yet his real power is not ſhown in the ſplendor of particular paſſages, but by the progreſs of his fable, and the tenor of his dialogue; and he that tries to recommend him by ſelect quotations, will ſucceed like the pedant in Hierocles, who, when he offered his houſe to ſale, carried a brick in his pocket as a ſpecimen.

"Upon every other ſtage the univerſal agent is love, by whoſe power all good and evil is diſtributed, and every action quickened or retarded. But love is only one of many paſſions; and as it has no great influence upon the ſum of life, it has little operation in the dramas of a poet who caught his ideas from the living world, and exhibited only what he ſaw before him. He knew that any other paſſion, as it was regular or exorbitant, was a cauſe of happineſs or calamity.

"Characters thus ample and general were not eaſily diſcriminated and preſerved; yet perhaps no poet ever kept his perſonages more diſtinct from each other.

"Other dramatiſts can only gain attention by hyperbolical or aggravated characters, by fabulous and unexampled excellence or depravity, as the writers of barbarous romances invigorated the reader by a giant and a dwarf; and he that ſhould form his expectations of human affairs from the play, or from the tale, would be equally deceived. Shakeſpeare has no heroes, his ſcenes are occupied only by men, who act and ſpeak as the reader thinks that he ſhould himſelf have ſpoken or acted on the ſame occaſion: Even where the agency is ſupernatural, the dialogue is level with life. Other writers diſguiſe the moſt natural paſſions and moſt frequent incidents; ſo that he who contemplates them in the book will not know them in the world: Shakeſpeare approximates the remote, and familiarizes the wonderful; the event which he repreſents will not happen, but if it were poſſible, its effects would probably be ſuch as he has aſſigned; and it may be ſaid, that he has not only ſhown human nature as it acts in real exigencies, but as it would be found in trials to which it cannot be expoſed.

"This therefore is the praiſe of Shakeſpeare, that his drama is the mirror of life; that he who has mazed his imagination, in following the phantoms which other writers raiſe up before him, may here be cured of his delirious ecſtaſies, by reading human ſentiments in human language: by ſcenes from which a hermit may eſti-

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mate the tranſactions of the world, and a confeſſor predict the progreſs of the paſſions."

The learning of Shakeſpeare has frequently been a ſubject of inquiry. That he poſſeſſed much claſſical knowledge does not appear, yet he was certainly acquainted with the Latin poets, particularly with Terence, as Colman has juſtly remarked, which appears from his uſing the word *thraſonical*. Nor was he unacquainted with French and Italian. We are indeed told, that the paſſages in which theſe languages occur might be impertinent additions of the players; but is it probable, that any of the players ſo far ſurpaſſed Shakeſpeare?

That much knowledge is ſcattered over his works is very juſtly obſerved by Pope; but it is often ſuch knowledge as books did not ſupply. "There is, however, proof enough (ſays Dr Johnſon) that he was a very diligent reader; nor was our language then ſo indigent of books, but that he might very liberally indulge his curioſity without excurſion into foreign literature. Many of the Roman authors were tranſlated, and ſome of the Greek; the Reformation had filled the kingdom with theological learning; moſt of the topics of human diſquiſition had found Engliſh writers; and poetry had been cultivated, not only with diligence, but ſucceſs. This was a ſtock of knowledge ſufficient for a mind ſo capable of appropriating and improving it."

The works of Shakeſpeare conſiſt of 35 dramatic pieces. The following is the chronological order which Mr Malone has endeavoured to eſtabliſh, after a minute inveſtigation, in which he has in general been ſucceſsful:

1. Firſt Part of King Henry VI.	1589
2. Second Part of King Henry VI.	1591
3. Third Part of King Henry VI.	1591
4. A Midſummer Night's Dream	1592
5. Comedy of Errors	1593
6. Taming of the Shrew	1594
7. Love's Labour Loſt	1594
8. Two Gentlemen of Verona	1595
9. Romeo and Juliet	1595
10. Hamlet	1596
11. King John	1596
12. King Richard II.	1597
13. King Richard III.	1597
14. Firſt Part of King Henry IV.	1597
15. Second Part of King Henry IV.	1598
16. The Merchant of Venice	1598
17. All's Well that Ends Well	1598
18. King Henry V.	1599
19. Much Ado about Nothing	1600
20. As you like it	1600
21. Merry Wives of Windſor	1601
22. King Henry VIII.	1601
23. Troilus and Creſſida	1602
24. Meaſure for Meaſure	1603
25. The Winter's Tale	1604
26. King Lear	1605
27. Cymbelline	1605
28. Macbeth	1606
29. Julius Cæſar	1607
30. Antony and Cleopatra	1608
31. Timon of Athens	1609
32. Coriolanus	1610
33. Othello	1611
34. The Tempeſt	1612
35. Twelfth Night	1614

Shakeſpeare.

The firſt three of theſe, Mr Malone thinks, there is very ſtrong reaſon to believe are not the original productions of Shakeſpeare; but that he probably altered them, and added ſome new ſcenes.

In the firſt folio edition in 1623, theſe plays were entitled "Mr William Shakeſpeare's Comedies, Hiſtories, and Tragedies." They have been publiſhed by various editors. The firſt folio edition by Iſaac Jaggard and Edward Blount; the ſecond, folio, 1632, by Thomas Cotes for Robert Allot; the third, 1664, for P. C.; the fourth, 1685, for H. Herringman, E. Brewſter, and R. Bentley. Rowe publiſhed an 8vo edition in 1709, in 7 vols, and a 12mo edition in 1714, in 9 vols; for which he received 36l. 10s. Pope publiſhed a 4to edition in 1725, in 6 vols, and a 12mo in 1728, in 10 vols; for which he was paid 217l. 12s. Theobald gave a new edition in 8vo in 1733, in 7 vols, another in 12mo in 1740, in 8 vols; and received for his labour 652l. 10s. Sir Thomas Hanmer publiſhed an edition in 1744, in 6 vols 4to. Dr Warburton's 8vo edition came out in 1747, in 8 vols; for which he was paid 560l. The editions publiſhed ſince that time, are Dr Johnſon's in 1765, in 8 vols 8vo. Stevens's in 1766, in 4 vols 8vo. Capell's in 1768, in 10 vols, crown 8vo; for this the author was paid 300l. A ſecond edition of Hanmer's in 1771, 6 vols. Johnſon's and Stevens's in 1773, in 10 vols 8vo; a ſecond edition in 1778; a third by Reed in 1785; and Malone's crown 8vo edition in 1789, in 10 vols.

The moſt authentic of the old editions is that of 1623. "At laſt (ſays Dr Johnſon) an edition was undertaken by Rowe; not becauſe a poet was to be publiſhed by a poet, for Rowe ſeems to have thought very little on correction or explanation, but that our author's works might appear like thoſe of his fraternity, with the appendages of a life and recommendatory preface. Rowe has been clamorouſly blamed for not performing what he did not undertake; and it is time that juſtice be done him, by confeſſing, that though he ſeems to have had no thought of corruption beyond the printer's errors, yet he has made many emendations, if they were not made before, which his ſucceſſors have received without acknowledgment, and which, if they had produced them, would have filled pages with cenſures of the ſtupidity by which the faults were committed, with diſplays of the abſurdities which they involved, with oſtentatious expoſitions of the new reading, and ſelf-congratulations on the happineſs of diſcovering it."

The nation had been for many years content enough with Mr Rowe's performance, when Mr Pope made them acquainted with the true ſtate of Shakeſpeare's text, ſhowed that it was extremely corrupt, and gave reaſon to hope that there were means of reforming it. Mr Pope's edition, however, he obſerves, fell below his own expectations; and he was ſo much offended, when he was found to have left any thing for others to do, that he paſſed the latter part of his life in a ſtate of hoſtility with verbal criticiſm.

The only taſk, in the opinion of Mr Malone, for which Pope was eminently and indiſputably qualified,

was

Shakespeare.

was to mark the faults and beauties of his author.—When he undertook the office of a commentator, every anomaly of language, and every expreſſion that was currently in uſe, were conſidered as errors or corruptions, and the text was altered or amended, as it was called, at pleaſure. Pope is openly charged with being one of the great corrupters of Shakeſpeare's text.

Pope was ſucceeded by Theobald, who collated the ancient copies, and rectified many errors. He was, however, a man of narrow comprehenſion and of little learning, and what is worſe, in his reports of copies and editions, he is not to be truſted without examination. From the liberties taken by Pope, the edition of Theobald was juſtly preferred, becauſe he profeſſed to adhere to the ancient copies more ſtrictly, and illuſtrated a few paſſages by extracts from the writers of our poet's age. Still, however, he was a conſiderable innovator; and while a few arbitrary changes made by Pope were detected, innumerable ſophiſtications were ſilently adopted.

Sir Thomas Hanmer, who comes next, was a man of critical abilities, and of extenſive learning. His corrections are commonly juſt, but ſometimes capricious. He is cenſurable, too, for receiving without examination almoſt all the innovations of Pope.

The original and predominant error of Warburton's commentary, is acquieſcence in his firſt thoughts; that precipitation which is produced by conſciouſneſs of quick diſcernment; and that confidence which preſumes to do, by ſurveying the ſurface, what labour only can perform, by penetrating to the bottom. His notes exhibit ſometimes perverſe interpretations, and ſometimes improbable conjectures; he at one time gives the author more profundity of meaning than the ſentence admits, and at another diſcovers abſurdities where the ſenſe is plain to every other reader. But his emendations are likewiſe often happy and juſt; and his interpretation of obſcure paſſages learned and ſagacious.

It has indeed been ſaid by his defenders, that his great object was to diſplay his own learning; and certainly, in ſpite of the clamour raiſed againſt him for ſubſtituting his own chimerical conceits inſtead of the genuine text of Shakeſpeare, his work increaſed his reputation. But as it is of little value as a commentary on Shakeſpeare, ſince Warburton is now gone, his work will probably ſoon ſink into oblivion.

In 1765 Dr Johnſon's edition, which had long been impatiently expected, was given to the public. His vigorous and comprehenſive underſtanding threw more light on his author than all his predeceſſors had done. The character which he gave of each play is generally juſt. His refutation of the falſe gloſſes of Theobald and Warburton, and his numerous explications of involved and difficult paſſages, entitle him to the gratitude of every admirer of Shakeſpeare.

The laſt editor is Mr Malone, who was eight years employed in preparing his edition. By collating the moſt authentic copies, he has been careful to purify the text. He has been ſo induſtrious, in order to diſcover the meaning of the author, that he has ranſacked many volumes, and truſts that, beſides his additional illuſtrations, not a ſingle valuable explication of any obſcure paſſage in theſe plays has ever appeared, which he has not inſerted in his edition. He rejects Titus Andronicus, as well as the three plays formerly mentioned, as not being the authentic productions of Shakeſpeare. To the whole he has added an appendix, and a copious gloſſary.—Of this work a leſs expenſive edition has been publiſhed in 7 vols 12mo, in which the general introductory obſervations prefixed to the different plays are preſerved, and the numerous notes abridged.

Shakeſpeare || Shamans.

This judicious commentator has certainly done more for the elucidation and correction of Shakeſpeare than all who came before him, and has followed with indefatigable patience the only road which a commentator of Shakeſpeare ought to obſerve.

Within 50 years after our poet's death, Dryden ſays that he was become "a little obſolete;" and in the beginning of the 18th century Lord Shafteſbury complains of his rude unpoliſhed ſtyle, and his antiquated phraſe and wit. Theſe complaints were owing to the great revolution which the Engliſh language has undergone, and to the want of an enlightened commentator. Theſe complaints are now removed, for an enlightened commentator has been found in Mr Malone.

We have only farther to add, that in the year 1790 a copious index to the remarkable paſſages and words in the plays of Shakeſpeare was publiſhed by the Reverend Mr Ayſcough; a gentleman to whom the literary world is much indebted for ſeveral very valuable keys of knowledge. In fine, the admirers of Shakeſpeare are now, by the labours of ſeveral eminent men, furniſhed with every help that can enable them to underſtand the ſenſe and to taſte the beauties of this illuſtrious poet.

SHAKLES. See SHACKLES.

SHALE, in MINERALOGY, a kind of SCHISTUS, of a black colour and flaty ſtructure, or a clay hardened into a ſtony conſiſtence, and ſo much impregnated with bitumen that it becomes ſomewhat like a coal. The acid emitted from ſhale, during its calcination, uniting itſelf to the argillaceous earth of the ſhale, forms alum. About 120 tons of calcined ſhale will make one ton of alum. The ſhale, after being calcined, is ſteeped in water, by which means the alum, which is formed during the calcination of the ſhale, is diſſolved: this diſſolved alum undergoes various operations before it is formed into the alum of the ſhops. Watſon's Chemical Eſſays, vol. ii. p. 315. See ALUM, CHEMISTRY *Index*.

This kind of ſlate forms large ſtrata in Derbyſhire; and that which lies near the ſurface of the earth is of a ſofter and more ſhivery texture than that which lies deeper. It is alſo found in large ſtrata, generally above the coal, in moſt coal counties of this kingdom.

SHALLOP, SHALLOOP, or SLOOP, is a ſmall light veſſel, with only a ſmall main-maſt and fore-maſt, and lug-ſails, to haul up, and let down, on occaſion.—Shallops are commonly good ſailers, and are therefore often uſed as tenders upon men of war.

SHALLOT, or ESCHALOT. See ALLIUM, BOTANY and GARDENING *Index*.

SHAMANS are wizards or conjurers, in high repute among ſeveral idolatrous nations inhabiting different parts of Ruſſia. By their enchantments they pretend to cure diſeaſes, to divert misfortunes, and to foretel futurity. They are great obſervers of dreams, by the interpretation of which they judge of their good or bad fortune. They pretend likewiſe to chiromancy, and to foretel a man's good or ill ſucceſs by the lines of his

Shambles, Shamois.

his hand. By theſe and ſuch like means they have a very great aſcendancy over the underſtandings, and a great influence on the conduct, of thoſe people.

SHAMBLES, among miners, a ſort of niches or landing places, left at ſuch diſtances in the adits of the mines, that the ſhovel-men may conveniently throw up the ore from ſhamble to ſhamble, till it comes to the top of the mine.

SHAMOIS, CHAMOIS, or SHAMMY, a kind of leather, either dreſſed in oil or tanned, much eſteemed for its ſoftneſs, pliancy, &c. It is prepared from the ſkin of the chamois, or ſhamois, a kind of rupicapra, or wild goat, called alſo iſard, inhabiting the mountains of Dauphiny, Savoy, Piedmont, and the Pyrenees. Beſides the ſoftneſs and warmth of the leather, it has the faculty of bearing ſoap without damage; which renders it very uſeful on many accounts.

In France, &c. ſome wear the ſkin raw, without any preparation. Shammy leather is uſed for the purifying of mercury, which is done by paſſing it through the pores of this ſkin, which are very cloſe. The true chamois leather is counterfeited with common goat, kid, and even with ſheep ſkins, the practice of which makes a particular profeſſion, called by the French *chamoiſure*. The laſt, though the leaſt eſteemed, is yet ſo popular, and ſuch vaſt quantities of it are prepared, eſpecially about Orleans, Marſeilles, and Tholouſe, that it may be proper to give the method of preparation.

Manner of ſhamoiſing, or of preparing ſheep, goat, or kid ſkins in oil, in imitation of ſhammy.—The ſkins, being waſhed, drained, and ſmeared over with quicklime on the fleſhy ſide, are folded in two lengthwiſe, the wool outwards, and laid in heaps, and ſo left to ferment eight days, or, if they had been left to dry after flaying, then fifteen days.

Then they are waſhed out, drained, and half dried; laid on a wooden leg, or horſe, the wool ſtripped off with a round ſtaff for that purpoſe, and laid in a weak pit, the lime whereof had been uſed before, and has loſt the greateſt part of its force.

After 24 hours they are taken out, and left to drain 24 more; they are then put in another ſtronger pit. This done, they are taken out, drained, and put in again, by turns; which begins to diſpoſe them to take oil; and this practice they continue for ſix weeks in ſummer, or three months in winter: at the end whereof they are waſhed out, laid on the wooden leg, and the ſurface of the ſkin on the wool ſide peeled off, to render them the ſofter; then made into parcels, ſteeped a night in the river, in winter more, ſtretched ſix or ſeven over one another on the wooden leg, and the knife paſſed ſtrongly on the fleſh ſide, to take off any thing ſuperfluous, and render the ſkin ſmooth. Then they are ſteeped, as before, in the river, and the ſame operation is repeated on the wool ſide; they are then thrown into a tub of water, with bran in it, which is brewed among the ſkins till the greateſt part ſticks to them, and then ſeparated into diſtinct tubs, till they ſwell, and riſe of themſelves above the water. By this means the remains of the lime are cleared out; they are then wrung out, hung up to dry on ropes, and ſent to the mill, with the quantity of oil neceſſary to ſcour them: the beſt oil is that of ſtock-fiſh. Here they are firſt thrown in bundles into the river for 12 hours, then laid in the mill-trough, and fulled without oil till they be well ſoftened; then oiled with the hand, one by one, and thus formed into parcels of four ſkins each; which are milled and dried on cords a ſecond time; then a third; and then oiled again, and dried. This proceſs is repeated as often as neceſſity requires; when done, if there be any moiſture remaining, they are dried in a ſtove, and made up into parcels wrapped up in wool; after ſome time they are opened to the air, but wrapped up again as before, till ſuch time as the oil ſeems to have loſt all its force, which it ordinarily does in 24 hours. The ſkins are then returned from the mill to the chamoiſer to be ſcoured; which is done by putting them in a lixivium of wood-aſhes, working and beating them in it with poles, and leaving them to ſteep till the ley hath had its effect; then they are wrung out, ſteeped in another lixivium, wrung again; and this is repeated till all the greaſe and oil be purged out. When this is done, they are half dried, and paſſed over a ſharp-edged iron inſtrument, placed perpendicular in a block, which opens, ſoftens, and makes them gentle. Laſtly, they are thoroughly dried, and paſſed over the ſame inſtrument again; which finiſhes the preparation, and leaves them in form of ſhammy.

Shamois ‖ Shannon.

Kid and goat ſkins are ſhamoiſed in the ſame manner as thoſe of ſheep, excepting that the hair is taken off without the uſe of any lime; and that when brought from the mill they undergo a particular preparation called *ramalling*, the moſt delicate and difficult of all the others. It conſiſts in this, that, as ſoon as brought from the mill, they are ſteeped in a fit lixivium, taken out, ſtretched on a round wooden leg, and the hair is ſcraped off with the knife; this makes them ſmooth, and in working to caſt a kind of fine knap. The difficulty is in ſcraping them evenly.

SHANK, or *SHANK-Painter*, in a ſhip, is a ſhort chain faſtened under the foremaſt ſhrouds, by a bolt, to the ſhip's ſides, having at the other end a rope faſtened to it. On this ſhank-painter the whole weight of the aft part of the anchor reſts, when it lies by the ſhip's ſide. The rope, by which it is hauled up, is made faſt about a timber-head.

SHANK, in the manege, that part of a horſe's fore leg which lies between the knee and the fetlock.

SHANKER, or CHANCRE, in *Medicine*, a malignant ulcer, uſually occaſioned by ſome venereal diſorder. See MEDICINE, N° 350.

SHANNON, the largeſt river in Ireland, and one of the fineſt in the Britiſh dominions, not only on account of its rolling 200 miles, but alſo of its great depth in moſt places, and the gentleneſs of its current, by which it might be made exceedingly ſerviceable to the improvement of the country, the communication of its inhabitants, and conſequently the promoting of inland trade, through the greateſt part of its long courſe. But the peculiar prerogative of the Shannon is its ſituation, running from north to ſouth, and ſeparating the province of Connaught from Leinſter and Munſter, and of conſequence dividing the greateſt part of Ireland into what lies on the eaſt and that on the weſt of the river; watering in its paſſage the valuable county of Leitrim, the plentiful ſhire of Roſcommon, the fruitful county of Galway, and the pleaſant county of Clare; the ſmall but fine ſhire of Longford, the King's county, and fertile county of Meath in Leinſter, the populous county of Tipperary, the ſpacious ſhire of Limerick,

Shanſcrit & Sharp.

rick, and the rough but pleaſant county of Kerry in Munſter; viſiting 10 counties in its paſſage, and having on its banks the following remarkable places, viz. Leitrim, Jameſtown, Laneſborough, Athlone, Clonfert, Killaloe, and Limerick; at 20 leagues below the latter it ſpreads gradually ſeveral miles in extent, ſo that ſome have conſidered its expanſion as a lake. It at laſt joins its waters to the ſea, being navigable all that way for the largeſt veſſels.

SHANSCRIT, the language of the Bramins of Hindoſtan. See PHILOLOGY, ſect. v.

SHARE *of a* PLOUGH, that part which cuts the ground; the extremity forwards being covered with a ſharp-pointed iron, called the *point of the ſhare*, and the end of the wood behind the *tail of the ſhare*.

SHARK. See SQUALUS, ICHTHYOLOGY *Index*.

SHARON, a name common to three cantons of Paleſtine. The firſt lay between Mount Tabor and the ſea of Tiberias; the ſecond between the city of Cæſarea of Paleſtine, and Joppa; and the third lay beyond Jordan. To give an idea of perfect beauty, Iſaiah ſaid, the glory of Lebanon and the beauty of Carmel muſt be joined to the abundance of Sharon. (Iſaiah xxxiii. 9. xxxi. 2.). The plains of Sharon are of vaſt extent; and, when ſurveyed by the Abbé Mariti a few years ago, they were ſown with cucumbers; and he informs us, that ſuch a number is annually produced, as not only to ſupply the whole neighbourhood, but alſo all the coaſts of Cyprus and the city of Damietta. In the middle of the plain, between Arſus and Lydda, riſes a ſmall mountain, upon the ridge of which there is a ſmall village called Sharon, from the name of the ancient city whoſe king was conquered by Joſhua.

SHARP, JAMES, archbiſhop of St Andrew's, was born of a good family in Banffſhire in 1618. He devoted himſelf very early to the church, and was educated for that purpoſe in the univerſity of Aberdeen. When the ſolemn league and covenant was framed in 1638, the learned men in that ſeminary, and young Sharp in particular, declared themſelves decidedly againſt it. To avoid the inſults and indignities to which he was ſubjected in conſequence of this conduct, he retired to England, where he contracted an acquaintance with ſome of the moſt celebrated divines in that country.

At the commencement of the civil wars he returned to Scotland. During his journey thither, he accidentally met with Lord Oxenford, who was ſo charmed with his converſation, that he invited him to his houſe. While he reſided with that nobleman, he became known to the earl of Rothes, who procured him a profeſſorſhip at St Andrew's. By the intereſt of the earl of Crawford he was ſoon after appointed miniſter of Crail; where he conducted himſelf, it is ſaid, in an exemplary manner.

Sharp had always inclined to the cauſe of royalty, and had for ſome time kept up a correſpondence with his exiled prince. After the death of the protector he began to declare himſelf more openly, and ſeems to have enjoyed a great ſhare of the confidence of Monk, who was at that time planning the reſtoration of Charles II. When that general marched to London, the preſbyterians ſent Sharp to attend him in order to ſupport their intereſts. At the requeſt of General Monk and the chief preſbyterians in Scotland, Mr Sharp was ſent over to the king at Breda to procure from him, if poſſible, the eſtabliſhment of preſbyterianiſm. On his return, he aſſured his friends that "he had found the king very affectionate to Scotland, and reſolved not to wrong the ſettled government of the church: but he apprehended they were miſtaken who went about to eſtabliſh the preſbyterian government." Sharp.

Charles was ſoon after reſtored without any terms. All the laws paſſed in Scotland ſince the year 1633 were repealed; the king and his miniſters reſolved at all hazards to reſtore prelacy. Mr Sharp, who had been commiſſioned by the Scotch preſbyterians to manage their intereſts with the king, was prevailed upon to abandon the party; and, as a reward for his compliance, he was made archbiſhop of St Andrew's. This conduct rendered him very odious in Scotland; he was accuſed of treachery and perfidy, and reproached by his old friends as a traitor and renegado. The abſurd and wanton cruelties which were afterwards committed, and which were imputed in a great meaſure to the archbiſhop, rendered him ſtill more deteſted. Nor is it probable that theſe accuſations were without foundation: the very circumſtance of his having been formerly of the preſbyterian party would induce him, after forſaking them, to treat them with ſeverity. Beſides, it is certain, that when after the rout at Pentland-hills he received an order from the king to ſtop the executions, he kept it for ſome time before he produced it to council.

There was one Mitchell a preacher, and a deſperate fanatic, who had formed the deſign of taking vengeance for theſe cruelties by aſſaſſinating the archbiſhop. He fired a piſtol at him as he was ſitting in his coach; but the biſhop of Orkney, lifting up his hand at the moment, intercepted the ball. Though this happened in the midſt of Edinburgh, the primate was ſo much deteſted, that nobody ſtopped the aſſaſſin; who, having walked leiſurely home, and thrown off his diſguiſe, returned, and mixed unſuſpected with the crowd. Some years after, the archbiſhop obſerving a man eyeing him with keenneſs, ſuſpected that he was the aſſaſſin, and ordered him to be brought before him. It was Mitchell. Two loaded piſtols were found in his pocket. The primate offered him a pardon if he would confeſs the crime; the man complied; but Sharp, regardleſs of his promiſe, conducted him to the council. The council alſo gave him a ſolemn promiſe of pardon if he would confeſs his guilt, and diſcover his accomplices. They were much diſappointed to hear that only one man was privy to his purpoſe, who was ſince dead. Mitchell was then brought before a court of juſtice, and ordered to make a third confeſſion, which he refuſed. He was impriſoned for ſeveral years, and then tried. His own confeſſion was urged againſt him. It was in vain for him to plead the illegality of that evidence, and to appeal to the promiſe of pardon previouſly given. The council took an oath that they had given no ſuch promiſe; and Mitchell was condemned. Lauderdale, who at that time governed Scotland, would have pardoned him, but the primate inſiſted on his excution; obſerving, that if aſſaſſins were permitted to go unpuniſhed, his life muſt be continually in danger. Mitchell was accordingly executed.

Sharp had a ſervant, one Carmichael, who by his cruelty had rendered himſelf particularly odious to the zealots. Nine men formed the reſolution of waylaying him in Magus-moor, about three miles from St Andrew's.

Sharp. drew's. While they were waiting for this man, the primate himſelf appeared with very few attendants. This they looked upon as a declaration of heaven in their favour; and calling out, "the Lord has delivered him into our hands," they ran up to the carriage. They fired at him without effect; a circumſtance which was afterwards imputed to magic. They then diſpatched him with their ſwords, regardleſs of the tears and intreaties of his daughter, who accompanied him (A).

Thus fell Archbiſhop Sharp, whoſe memory is even at preſent deteſted by the common people of Scotland. His abilities were certainly good, and in the early part of his life he appears with honour and dignity. But his conduct afterwards was too cruel and inſincere to merit approbation. His treatment of Mitchell was mean and vindictive. How far he contributed to the meaſures adopted againſt the preſbyterians is not certain. They were equally cruel and impolitic; nor did their effects ceaſe with the meaſures themſelves. The unheard-of cruelties exerciſed by the miniſters of Cha. II. againſt the adherents of the covenant, raiſed ſuch a flame of enthuſiaſm and bigotry as is not yet entirely extinguiſhed.

SHARP, *Dr John*, archbiſhop of York, was deſcended from the Sharps of Little Norton, a family of Bradford Dale in Yorkſhire; and was ſon of an eminent tradeſman of Bradford, where he was born in 1644. He was educated at Cambridge, and in 1667 entered into orders. That ſame year he became domeſtic chaplain to Sir Heneage Finch, then attorney-general. In 1672 he was collated to the archdeaconry of Berkſhire. In 1675 he was inſtalled a prebendary in the cathedral church of Norwich; and the year following was inſtituted into the rectory of St Bartholomew near the Royal Exchange, London. In 1681 he was, by the intereſt of his patron Sir Heneage Finch, then lord high chancellor of England, made dean of Norwich; but in 1686 was ſuſpended for taking occaſion, in ſome of his ſermons, to vindicate the doctrine of the church of England in oppoſition to Popery. In 1688 he was ſworn chaplain to King James II. being then probably reſtored after his ſuſpenſion for it is certain that he was chaplain to King Charles II. and attended as a court chaplain at the coronation of King James II. In 1689 he was declared dean of Canterbury; but never could be perſuaded to fill up any of the vacancies made by the deprived biſhops. Upon the death of Dr Lamplugh, he was promoted to the ſee of York. In 1702 he preached the ſermon at the coronation of Queen Anne; and the ſame year was ſworn of the privy-council, and made lord almoner to her majeſty. He died at Bath in 1713; and was interred in the cathedral of York, where a monument is erected to his memory.—His ſermons, which were collected after his death and publiſhed in 7 vols 8vo, are juſtly admired. Sharp.

SHARP, *Abraham*, an eminent Engliſh mathematician, and aſtronomer, was born at Little Horton, near Bradford, in the year 1651. He was put apprentice to a merchant at Mancheſter; but ſo ſtrongly was he inclined to the ſtudy of mathematics, that he ſoon found his ſituation both irkſome and diſagreeable. By the mutual conſent, therefore, of his maſter and himſelf, he quitted the buſineſs of a merchant. He then removed to Liverpool, where he wholly devoted himſelf to mathematical ſtudies, and where, for a ſubſiſtence, he taught writing and accounts.

Soon after this a merchant from London, in whoſe houſe the celebrated Mr Flamſteed then lodged, engaged Mr Sharp to be his book-keeper. With this eminent aſtronomer he ſoon contracted an intimate friendſhip, and by his recommendation he obtained a more profitable employment in the dock-yard of Chatham, where he continued till his friend and patron called him to his aſſiſtance. Mr Sharp was chiefly employed in the conſtruction of the mural arch, which he finiſhed in the courſe of 14 months ſo entirely to the ſatisfaction of Mr Flamſteed, that he ſpoke of him in terms of the higheſt praiſe. In the opinion of Mr Smeaton, this was the firſt good inſtrument of the kind, and Mr Sharp the firſt artiſt who cut delicate diviſions on aſtronomical inſtruments. When this inſtrument was conſtructed, Mr Sharp was but 25, and Mr Flamſteed 30 years of age. Mr Sharp aſſiſted his friend in making a catalogue of nearly 3000 fixed ſtars, with their longitudes and magnitudes, their right aſcenſions and polar diſtances, with the variations of the ſame while they change their longitude by one degree.

But from the fatigue of conſtantly obſerving the ſtars by night, in a cold thin air, added to a weakly conſtitution, his health was much impaired; for the recovery of which he requeſted leave to retire to his houſe at Horton, where, as ſoon as he felt himſelf recovering, he began to fit up an obſervatory of his own, and the teleſcopes he made uſe of were all of his own conſtruction, and the lenſes ground and adjuſted with his own hands.

It was about this time that he aſſiſted Mr Flamſteed in calculating moſt of the tables in the ſecond volume of his *Hiſtoria Cæleſtis*, as appears by their letters, to be ſeen in the hands of Mr Sharp's friends at Horton. The mathematician, ſays Dr Hutton, meets with ſomething extraordinary in Sharp's elaborate treatiſe of *Geometry Improved;* by a large and accurate table of ſegments of circles, its conſtruction and various uſes in the ſolution of ſeveral difficult problems, with compendious tables for finding a true proportional part; and their uſe in theſe or any other tables exemplified in making logarithms,

(A) Such is the account given by all our hiſtorians of the murder of Archbiſhop Sharp; and that he fell by the hands of fanatics, whom he perſecuted, is certain. A tradition, however, has been preſerved in different families deſcended from him, which may be mentioned, and is in itſelf certainly not incredible. The primate, it ſeems, who, when miniſter of Crail, was peculiarly ſevere in puniſhing the ſin of fornication, had, in the plenitude of his archiepiſcopal authority, taken notice of a criminal amour carried on between a nobleman high in office and a lady of ſome faſhion who lived within his dioceſe. This interference was in that licentious age deemed very impertinent; and the archbiſhop's deſcendants believe that the proud peer inſtigated the deluded rabble to murder their anceſtor.

Sharp || Shaſter.

logarithms, or their natural numbers, to 60 places of figures; there being a table of them for all primes to 1100, true to 61 figures. His conciſe treatiſe of Polyedra, or ſolid bodies of many baſes, both of the regular ones and others; to which are added, 12 new ones, with various methods of forming them, and their exact dimenſions in ſurds or ſpecies, and in numbers; illuſtrated with a variety of copper-plates, neatly engraved by his own hands. Indeed, few of the mathematical inſtrument makers could exceed him in exactly graduating or neatly engraving mathematical or aſtronomical inſtruments. He poſſeſſed a remarkably clear head for contriving, and an extraordinary hand for executing any thing, not only in mechanics, but likewiſe in drawing, writing, and making the moſt beautiful figures in all his calculations and conſtructions.

The quadrature of the circle was undertaken by him for his own amuſement, in the year 1699, deduced from two different ſeries, by which the truth of it was proved to 72 places of figures, as may be ſeen in Sherwin's Tables of Logarithms. In the ſame book may likewiſe be ſeen his ingenious improvements on the making of logarithms, and the conſtructing of the natural ſines, tangents, and ſecants.

Mr Sharp kept up a correſpondence with moſt of the eminent mathematicians and aſtronomers of his time, as Flamſteed, Newton, Halley, Wallis, Hodgſon, &c. the anſwers to whoſe letters are all written on the backs or empty ſpaces, of the letters he received, in a ſhort hand of his own invention. Being one of the moſt accurate and indefatigable computers whoever exiſted; he was many years the common reſource for Flamſteed, Sir Jonas Moor, Halley, and others, in all ſorts of troubleſome and delicate calculations.

Mr Sharp was never married, and ſpent his time as a hermit. He was of a middle ſtature, very thin, of a weakly conſtitution; but remarkably feeble during the laſt 3 or 4 years before his death, which happened on the 18th of July 1742, in the 91ſt year of his age.

He was very irregular as to his meals, and uncommonly ſparing in his diet, which he frequently took in the following manner. A little ſquare hole, reſembling a window, formed a communication between the room where he uſually ſtudied, and another where a ſervant could enter; and before this hole he had contrived a ſliding board. It often happened, that the breakfaſt, dinner, and ſupper, have remained untouched, when the ſervant has gone to remove what was left,—ſo deeply was he engaged in calculations.

SHARP, in *Muſic*. See INTERVAL.

SHASTAH, the ſame as SHASTER.

SHASTER, SHASTAH, or BEDANG, the name of a ſacred book, in high eſtimation among the idolaters of Hindoſtan, containing all the dogmas of the religion of the bramins, and all the ceremonies of their worſhip; and ſerving as a commentary on the VEDAM.

The term *Shaſter* denotes "ſcience" or "ſyſtem"; and is applied to other works of aſtronomy and philoſophy, which have no relation to the religion of the Indians. None but the bramins and rajahs of India are allowed to read the Vedam; the prieſts of the Banians, called *Shuderers*, may read the Shaſter; and the people, in general, are allowed to read only the Paran or Pouran, which is a commentary on the Shaſter.

Shaſter.

The Shaſter is divided into three parts: the firſt containing the moral law of the Indians; the ſecond, the rites and ceremonies of their religion; and the third, the diſtribution of the people into tribes or claſſes, with the duties pertaining to each claſs.

The principal precepts of morality, contained in the firſt part of the Shaſter, are the following: that no animal be killed, becauſe the Indians attribute ſouls to brute animals as well as to mankind; that they neither hear nor ſpeak evil, nor drink wine, nor eat fleſh, nor touch any thing that is unclean; that they obſerve the feaſts, prayers, and waſhings, which their law preſcribes; that they tell no lies, nor be guilty of deceit in trade; that they neither oppreſs nor offer violence to one another; that they celebrate the ſolemn feaſts and faſts, and appropriate certain hours of ordinary ſleep to cultivate a diſpoſition for prayer; and that they do not ſteal or defraud one another.

The ceremonies, contained in the ſecond part of the Shaſter, are ſuch as theſe: that they waſh often in the rivers, hereby obtaining the pardon of their ſins; that they mark their forehead with red, in token of their relation to the Deity; that they preſent offerings and prayers under certain trees, ſet apart for this purpoſe; that they pray in the temples, make oblations to their pagodas or idols, ſing hymns, and make proceſſions, &c.; that they make pilgrimages to diſtant rivers, and eſpecially to the Ganges, there to waſh themſelves and make offerings; that they make vows to particular ſaints, according to their reſpective departments; that they render homage to the Deity at the firſt ſight of the ſun; that they pay their reſpect to the ſun and moon, which are the two eyes of the Deity; and that they treat with particular veneration thoſe animals that are deemed more pure than others; as the cow, buffalo, &c.; becauſe the ſouls of men have tranſmigrated into theſe animals.

The third part of the Shaſter records the diſtribution of the people into four claſſes: the firſt being that of the bramins or prieſts, appointed to inſtruct the people; the ſecond, that of the kutteris or nobles, who are the magiſtrates; the third, that of the ſhudderis or merchants; and the fourth, that of the mechanics. Each perſon is required to remain in the claſs in which he was born, and to purſue the occupation aſſigned to him by the Shaſter. According to the bramins, the Shaſter was imparted by God himſelf to Brahma, and by him to the bramins; who communicated the contents of it to the people.

Modern writers have given us very different accounts of the antiquity and importance of the Shaſter. Mr Holwell, who had made conſiderable progreſs in the tranſlation of this book, apprehends, that the mythology as well as the coſmogony of the Egyptians, Greeks, and Romans, was borrowed from the doctrines of the bramins, contained in it, even to the copying of their exteriors of worſhip, and the diſtribution of their idols, though groſsly mutilated and adulterated. With reſpect to the Vedam and Shaſter, or ſcriptures of the Gentoos, this writer informs us, that *Vedam*, in the Malabar language, ſignifies the ſame as *Shaſter* in the Shanſcrit; and that the firſt book is followed by the Gentoos of the Malabar and Coromandel coaſts, and alſo of the iſland of Ceylon. The Shaſter is followed by the Gentoos of the provinces of Bengal, and by all the

Shaſter. Gentoos of the reſt of India, commonly called *India Proper*, along the courſe of the rivers Ganges and Jumna to the Indus. Both theſe books (he ſays) contain the inſtitutes of their reſpective religion and worſhip, as well as the hiſtory of their ancient rajahs and princes, often couched under allegory and fable. Their antiquity is contended for by the partiſans of each; but he thinks, that the ſimilitude of their names, idols, and great part of their worſhip, leaves little room to doubt, nay plainly evinces, that both theſe ſcriptures were originally one. He adds, if we compare the great purity and chaſte manners of the Shaſter with the great abſurdities and impurities of the Vedam, we need not heſitate to pronounce the latter a corruption of the former.

With regard to the high original of theſe ſcriptures, the account of the bramins is as follows. Brahma (that is, "Mighty Spirit"), about 4866 years ago, aſſumed the form of man and the government of Indoſtan. He tranſlated the divine law (deſigned for the reſtoration of mankind, who had offended in a pre-exiſtent ſtate, and who are now in their laſt ſcene of probation, to the dignity from which they were degraded) out of the language of angels into the well known Shanſcrit language, and called his tranſlation the *Chartah Bhade Shaſtah of Birmah*, or *the Six Scriptures of Divine Words of the Mighty Spirit*. He appointed the bramins, deriving their name from him, to preach the word of God; and the doctrines of the Shaſter were accordingly preached in their original purity 1000 years. About this time there was publiſhed a paraphraſe on the Chartah Bhade; and about 500 years afterwards, a ſecond expoſition, called the *Aughtorrah Bhade Shaſta*, or *Eighteen Books of Divine Words*, written in a character compounded of the common Indoſtan and the Shanſcrit. This innovation produced a ſchiſm among the Gentoos; on which occaſion, it is ſaid, thoſe of Coromandel and Malabar formed a ſcripture of their own, which they pretended to be founded on the Chartah Bhade of Bramah, and called it *the Vedam of Birmah*, or *Divine Words of the Mighty Spirit*. The original Chartah Bhade was thrown aſide, and at length wholly unknown, except to a few families; who can ſtill read and expound it in the Shanſcrit character. With the eſtabliſhment of the Aughtorrah Bhade, and Vedam, which, according to the Gentoo account, is 3366 years ago, their polytheiſm commenced; and the principles of religion became ſo obſcure, and their ceremonies ſo numerous, that every head of a family was obliged to keep a bramin as a guide both in faith and practice. Mr Holwell is of opinion, that the Chartah Bhade, or Original Scriptures, are not copied from any other ſyſtem of theology, promulgated to or obtruded upon mankind. The Gentoos do not attribute them to Zoroaſter; and Mr Holwell ſuppoſes, that both Zoroaſter and Pythagoras viſited Indoſtan, not to inſtruct, but to be inſtructed.

From the account of Mr Dow, we learn, that the books which contain the religion and philoſophy of the Hindoos are diſtinguiſhed by the name of *Bedas;* that they are four in number, and like the ſacred writings of other nations, ſaid to be penned by the Divinity. Beda, he ſays, in the Shanſcrit language, literally ſignifies *ſcience;* and theſe books treat not only of religion and moral duties, but of every branch of philoſophic knowledge. The bramins maintain, that the Bedas are the divine laws, which Brimha, at the creation of the world, delivered for the inſtruction of mankind; but they affirm, that their meaning was perverted in the firſt age by the ignorance and wickedneſs of ſome princes, whom they repreſent as evil ſpirits, who then haunted the earth. Shaſter.

The firſt credible account we have of the Bedas is, that about the commencement of the Cal Jug, of which era the year 1768 was the 4886th year, they were written, or rather collected, by a great philoſopher and reputed prophet, called *Beäſs Muni*, or *Beäſs the Inſpired.*

The Hindoos (ſays Mr Dow) are divided into two great religious ſects: the followers of the doctrine of Bedang, which is the original Shaſter, or commentary upon the Bedas; and thoſe who adhere to the principles of the Neadirſen. The original Shaſter is called *Bedang*, and is a commentary upon the Bedas. This book, he ſays, is erroneouſly called in Europe the *Vedam.* It is aſcribed to Beäſs Muni, and is ſaid to have been reviſed ſome years after by one Serrider Swami, ſince which it has been reckoned ſacred, and not ſubject to any farther alterations.

Almoſt all the Hindoos of the Decan, and thoſe of the Malabar and Coromandel coaſts, are of this ſect. The followers of the Bedang Shaſter do not allow that any phyſical evil exiſts; they maintain that God created all things perfectly good; but that man, being a free agent, may be guilty of moral evil, which may be injurious to himſelf, but can be of no detriment to the general ſyſtem of nature. God, they ſay, being perfectly benevolent, never puniſhed the wicked otherwiſe than by the pain and affliction which are the natural conſequences of evil actions; and hell, therefore, is no other than a conſciouſneſs of evil.

The Neadirſen Shaſter is ſaid to have been written by a philoſopher called *Goutam*, near four thouſand years ago. The bramins, from Mr Dow's account of their ſacred books, appear to believe invariably in the unity, eternity, omniſcience, and omnipotence of God; and the polytheiſm of which they have been accuſed is no more than a ſymbolical worſhip of the divine attributes, which they divide into three claſſes. Under the name of *Brimha*, they worſhip the wiſdom and creative power of God; under the appellation of *Biſhen*, his providential and preſerving quality; and under that of *Shibah*, that attribute which tends to deſtroy.

As few of our readers may have an opportunity of peruſing the Shaſter, we ſhall, by way of ſpecimen, ſubjoin a paſſage from it, which, though it contains ſome metaphyſical myſteries concerning the creation, yet diſcovers views of God ſo enlightened that they would not diſgrace more refined nations. The paſſage which we ſhall quote is the firſt chapter of the Shaſter, which is a dialogue between Brimha the Wiſdom of the Divinity, and Narud or Reaſon, who is repreſented as the ſon of Brimha. Narud deſires to be inſtructed by his father; and for that purpoſe puts the following queſtions to him:

"*Narud.* O father! thou firſt of God, thou art ſaid to have created the world, and thy ſon Narud, aſtoniſhed at what he beholds, is deſirous to be inſtructed how all theſe things were made.

"*Brimha.* Be not deceived, my ſon! do not imagine that

Shaſter. that I was the creator of the world, independent of the Divine Mover, who is the great original eſſence and creator of all things. Look, therefore, only upon me as the inſtrument of the great *will*, and a part of his being, whom he called forth to execute his eternal deſigns.

" *Narud.* What ſhall we think of God?

" *Brimha.* Being immaterial, he is above all conception; being inviſible, he can have no form; but, from what we behold in his works, we may conclude that he is eternal, omnipotent, knowing all things, and preſent everywhere.

" *Narud.* How did God create the world?

" *Brimha.* Affection dwelt with God from all eternity. It was of three different kinds; the creative, the preſerving, and the deſtructive. This firſt is repreſented by Brimha, the ſecond by Biſhen, and the third by Shibah. You, O Narud! are taught to worſhip all the three in various ſhapes and likeneſſes, as the Creator, the Preſerver, and the Deſtroyer. The affection of God then produced power, and power, at a proper conjunction of time and fate, embraced goodneſs, and produced matter. The three qualities then acting upon matter, produced the univerſe in the following manner: From the oppoſite actions of the creative and deſtructive quality in matter, ſelf-motion firſt aroſe. Self-motion was of three kinds; the firſt inclining to plaſticity, the ſecond to diſcord, and the third to reſt. The diſcordant actions then produced the Akaſh (a kind of celeſtial element), which inviſible element poſſeſſed the quality of conveying ſound; it produced air, a palpable element; fire, a viſible element; water, a fluid element; and earth, a ſolid element.

" The Akaſh diſperſed itſelf abroad. Air formed the atmoſphere; fire, collecting itſelf, blazed forth in the hoſt of heaven; water roſe to the ſurface of the earth, being forced from beneath by the gravity of the latter element. Thus broke forth the world from the veil of darkneſs, in which it was formerly comprehended by God. Order roſe over the univerſe. The ſeven heavens were formed, and the ſeven worlds were fixed in their places; there to remain till the great diſſolution, when all things ſhall be abſorbed into God.

" God ſeeing the earth in full bloom, and that vegetation was ſtrong from its ſeeds, called forth for the firſt time intellect, which he endued with various organs and ſhapes, to form a diverſity of animals upon the earth. He endued the animals with five ſenſes; feeling, ſeeing, ſmelling, taſting, and hearing; but to man he gave reflection, to raiſe him above the beaſts of the field.

" The creatures were created male and female, that they might propagate their ſpecies upon the earth. Every herb bore the ſeed of its kind, that the world might be clothed with verdure, and all animals provided with food.

" *Narud.* What doſt thou mean, O father! by Intellect?

" *Brimha.* It is a portion of the *great ſoul* of the univerſe breathed into all creatures, to animate them for a certain time.

" *Narud.* What becomes of it after death?

" *Brimha.* It animates other bodies, or returns, like a drop, into that unbounded ocean from which it firſt aroſe.

" *Narud.* Shall not then the ſouls of good men receive rewards? nor the ſouls of the bad meet with puniſhment? Shaſter, Shaw.

" *Brimha.* The ſouls of men are diſtinguiſhed from thoſe of other animals; for the firſt are endued with reaſon, and with a conſciouſneſs of right and wrong. If therefore man ſhall adhere to the firſt, as far as his powers ſhall extend, his ſoul, when diſengaged from the body by death, ſhall be abſorbed into the divine eſſence, and ſhall never more reanimate fleſh: But the ſouls of thoſe who do evil are not, at death, diſengaged from all the elements. They are immediately clothed with a body of fire, air, and akaſh, in which they are for a time puniſhed in hell. After the ſeaſon of their grief is over, they reanimate other bodies; but till they ſhall arrive at a ſtate of purity they can never be abſorbed into God.

" *Narud.* What is the nature of that abſorbed ſtate which the ſouls of good men enjoy after death?

" *Brimha.* It is a participation of the divine nature, where all paſſions are utterly unknown, and where conſciouſneſs is loſt in bliſs.

" *Narud.* Thou ſayeſt, O father, that unleſs the ſoul is perfectly pure it cannot be abſorbed into God: now, as the actions of the generality of men are partly good and partly bad, whither are their ſpirits ſent immediately after death?

" *Brimha.* They muſt atone for their crimes in hell, where they muſt remain for a ſpace proportioned to the degree of their iniquities; then they riſe to heaven to be rewarded for a time for their virtues; and from thence they will return to the world to reanimate other bodies.

" *Narud.* What is time?

" *Brimha.* Time exiſted from all eternity with God: but it can only be eſtimated ſince motion was produced, and only be conceived by the mind, from its own conſtant progreſs.

" *Narud.* How long ſhall this world remain?

" *Brimha.* Until the four jugs ſhall have revolved. Then Rudder (the ſame with *Shibah*, the deſtroying quality of God), with the ten ſpirits of diſſolution, ſhall roll a comet under the moon, that ſhall involve all things in fire, and reduce the world into aſhes. God ſhall then exiſt alone, for matter will be totally annihilated."

Thoſe who deſire more information on this ſubject may conſult Dow's Hiſtory of Indoſtan, and Holwell's Intereſting Hiſtorical Events.

SHAW, Dr Thomas, known to the learned world by his travels to Barbary and the Levant, was born at Kendal in Weſtmoreland about the year 1692. He was appointed chaplain to the Engliſh conſul at Algiers, in which ſtation he continued for ſeveral years; and from thence took proper opportunities of travelling into different parts. He returned in 1733; was elected fellow of the Royal Society; and publiſhed the account of his travels at Oxford, folio, 1738. In 1740 he was nominated principal of St Edmond-hall, which he raiſed from a ruinous ſtate by his munificence; and was regius profeſſor of Greek at Oxford until his death, which happened in 1751. Dr Clayton, biſhop of Clogher, having attacked theſe Travels in his Deſcription of the Eaſt, Dr Shaw publiſhed a ſupplement by way of vin-

Shawia ‖ Sheathing.

dication, which is incorporated into the ſecond edition of his Travels, prepared by himſelf, and publiſhed in 4to, 1757.

SHAWIA, a genus of plants, belonging to the claſs ſyngeneſia, and order polygamia ſegregata, of which the characters are the following; the calyx is imbricated with five or ſix leaves, the three interior of which are larger; the corolla is five-cleft; there is one oblong ſeed. One ſpecies only has been diſcovered, which is a native of New Zealand.

SHAWLS, are woollen handkerchiefs, an ell wide, and near two long. The wool is ſo fine and ſilky, that the whole handkerchief may be contained in the two hands cloſed. It is the produce of a Tibet ſheep; but ſome ſay that no wool is employed but that of lambs torn from the belly of their mother before the time of birth. The moſt beautiful ſhawls come from Caſhmire: their price is from 150 livres (about ſix guineas) to 1200 livres (or 50l. ſterling).

In the Tranſactions of the Society for Encouraging Arts, Manufactures, &c. for the year 1792, we are informed that a ſhawl counterpane, four yards ſquare, manufactured by Mr P. J. Knights of Norwich, was preſented to the ſociety; and that, upon examination, it appeared to be of greater breadth than any goods of equal fineneſs and texture that had ever before been preſented to the ſociety, or to their knowledge woven in this country. The ſhawls of Mr Knights's manufacture, it is ſaid, can ſcarcely be diſtinguiſhed from Indian ſhawls, though they can be afforded at one-twentieth part of the price. When the ſhawl is 16 quarters ſquare, Mr Knights ſays it may be retailed at 20l.; if it conſiſted of 12 quarters, and embroidered as the former, it will coſt 15l.; if plain, with a fringe only, a ſhawl of 16 quarters ſquare may be ſold at 8l. 8s.; if 12 quarters and fringed, at 6l. 6s.

Mr Knights maintains, that his counterpane of four yards ſquare is equal in beauty, and ſuperior in ſtrength, to the Indian counterpanes, which are ſold at 200 guineas. The principal conſumption of this cloth is in train-dreſſes for ladies; as likewiſe for long ſcarfs, in imitation of the real Indian ſcarfs, which are ſold from 60l. to 80l.; whereas ſcarfs of this fabric are ſold for as many ſhillings, and the ladies ſquare ſhawls in proportion.

SHEADING, a riding, tything, or diviſion, in the iſle of Man; the whole iſland being divided into ſix ſheadings; in every one of which is a coroner or chief conſtable, appointed by the delivery of a rod at the annual convention.

SHEARBILL, the *Rhynchops Nigra* of Linnæus, the *Black Skimmer* of Pennant and Latham, and *Cutwater* of Cateſby. See ORNITHOLOGY *Index*.

SHEATHING, in the ſea-language, is the caſing that part of a ſhip which is to be under water with fir-board of an inch thick; firſt laying hair and tar mixed together under the boards, and then nailing them on, in order to prevent worms from eating the ſhip's bottom.—Ships of war are now generally ſheathed with copper: but copper ſheathing is liable to be corroded by the action of ſalt water, and ſomething is ſtill wanting to effect this purpoſe. It is very probable that tar might anſwer very well.

In the Corniſh mines, copper or braſs pumps are often placed in the deepeſt parts, and are conſequently expoſed to the vitriolic or other mineral waters with which ſome of theſe mines abound, and which are known to have a much ſtronger effect on copper than ſea water. Theſe pumps are generally about ſix feet long, and are ſcrewed together, and made tight by the interpoſition of a ring of lead, and the joinings are afterwards tarred. One of theſe pumps was ſo much corroded as to render it unfit for uſe; but the ſpots of tar, which by accident had dropped on it, preſerved the parts they covered from the action of the water. Theſe projected in ſome places more than a quarter of an inch; and the joints were ſo far defended by the thin coat of tar, that it was as perfect as when it came from the hands of the manufacturer. If tar thus effectually defends copper from theſe acrid waters, can there remain a doubt of its preſerving it from the much milder waters of the ſea?

Sheathing ‖ Shebbeare.

SHEATS, in a ſhip, are ropes bent to the clews of the ſails, ſerving in the lower ſails to haul aft the clews of the ſail; but in topſails they ſerve to haul home the clew of the ſail cloſe to the yard-arm.

SHEAVE, in *Mechanics*, a ſolid cylindrical wheel, fixed in a channel, and moveable about an axis, as being uſed to raiſe or increaſe the mechanical powers applied to remove any body.

SHEBBEARE, JOHN, a political writer, was born at Bideford in Devonſhire, in the year 1709. He received the rudiments of his education at the free grammar ſchool of Exeter. It has been often obſerved, that the future life of a man may be gathered from his puerile character; and accordingly Shebbeare, while a boy at ſchool, gave the ſtrongeſt indications of his future eminence in miſanthropy and learning, by the extraordinary tenacioufneſs of his memory and the readineſs of his wit, as well as the malignity of his diſpoſition; being univerſally regarded as a young man of ſurpriſing genius, while at the ſame time he was deſpiſed for his malicious temper.

About the age of 16, Shebbeare was bound apprentice to an eminent ſurgeon in his native town, under whom he acquired a conſiderable ſhare of medical knowledge. His talent for lampoon appeared at this early period, and he could not forbear from exerciſing it on his maſter; but the chief marks for the arrows of his wit were the gentlemen of the corporation, ſome of whom laughed at ſuch triſles, while ſuch as were irritable often commenced proſecutions againſt him, but without ſucceſs. He was frequently ſummoned to appear at the ſeſſions, for daring to ſpeak and write diſreſpectfully of the magiſtrates; but the laugh was always on the ſide of Shebbeare.

When his time was out, he ſet up for himſelf, then diſcovering a taſte for chemiſtry; ſoon after which he married an amiable young woman with no fortune, but of reſpectable connections. Failing in buſineſs at Bideford, he went to Briſtol in 1736, entering into partnerſhip with a chemiſt, and never afterwards viſited his native town.

The attention of the public was, in the year 1739, attracted by an epitaph to the memory of Thomas Coſter, Eſq. M. P. for Briſtol, in which he contrived to raiſe emotions of pity, grief, and indignation. In the following year he publiſhed a pamphlet on the Briſtol waters, after which we know little or nothing reſpecting him for a number of years. He was at Paris in 1752, where he obtained, it is ſaid, the degree of doctor in medicine,

Shebbeare. a fact, however, which many are diſpoſed to queſtion. About this time he began to emerge from obſcurity, and draw the attention of the public, by pamphlets written with ſuch virulence and celerity as it would be difficult to equal in the moſt intemperate times. In 1754 he commenced his career with a work denominated the *Marriage Act*, a political novel, in which he treated the legiſlature with ſuch freedom that he was apprehended, but ſoon after ſet at liberty.

The moſt celebrated performances, however, were a ſeries of letters to the People of England, written in a vigorous and energetic ſtyle, well calculated to make an impreſſion on common readers; and they were of courſe read with avidity, and diligently circulated. They galled the miniſtry, who at firſt were too eager to puniſh the author. When the third letter was publiſhed, warrants were iſſued by Lord Holderneſſe in March 1756, to take up both the publiſher and the author; a proſecution which appears to have been dropt. On the 12th of January 1758, the ſame nobleman ſigned a general warrant for apprehending the author, printer, and publiſhers of a wicked, audacious, and treaſonable libel, entitled, "A ſixth letter to the people of England, on the progreſs of national ruin, in which is ſhewn that the preſent grandeur of France and calamities of this nation are owing to the influence of Hanover on the councils of England;" and then having found, to ſeize and apprehend, together with their books and papers.

Government having received information that a ſeventh letter was in the preſs, all the copies were ſeized and ſuppreſſed by virtue of another warrant, dated January 23. In Eaſter term an information was filed againſt him by the attorney-general, and on the 17th of June the information was tried, when Shebbeare was found guilty; and on the 28th of November he received ſentence, by which he was fined 5l. ordered to ſtand in the pillory December 5. at Charing Croſs, to be confined three years, and to give ſecurity for his good behaviour for ſeven years, himſelf in 500l. and two others in 250l. each. During his confinement, he declared he never received as preſents more than 20 guineas from all the world.

He was detained in priſon during the whole time of the ſentence, and with ſome degree of rigour; for when his life was in danger from a bad ſtate of health, and he applied to the court of king's-bench for permiſſion to be carried into the rules a few hours in a day; though Lord Mansfield acceded to the petition, the prayer of it was denied and defeated by Judge Foſter. At the termination of the time of his ſentence, a new reign commenced; and ſhortly afterwards, during Mr Grenville's adminiſtration, a penſion of 200l. a-year was granted him by the crown, through the influence of Sir John Philips; and he ever after became devoted to the ſervice of government. He was of courſe abuſed in almoſt every periodical work, which he ſeems in general to have had the good ſenſe to neglect. Dr Smollet introduced him, in no very reſpectful light, under the name of Ferret, in Sir Launcelot Greaves; and Mr Hogarth made him one of the group in the third election print.

During the latter part of his life he ſeems to have written but little. He ſtrenuouſly ſupported the miniſtry during the American war, having publiſhed, in 1775, an anſwer to the printed ſpeech of Edmund Burke, Eſq. ſpoken in the houſe of commons, April 19. 1774, wherein he inveſtigates his knowledge of polity, legiſlature, human kind, hiſtory, commerce, and finance; his arguments are examined; the conduct of adminiſtration is boldly defended, and his talents as an orator clearly expoſed to view. An eſſay on the origin, progreſs, and eſtabliſhment of National Society; in which the principles of government, the definition of phyſical, moral, civil, and religious liberty contained in Dr Price's obſervations, &c. are examined and controverted; together with a juſtification of the legiſlature in reducing America to obedience by force. Shebbeare, Sheep.

His publications of a ſatirical, political, and medical nature, amount to 34, beſides a novel called Filial Piety, in which hypocriſy and bluſtering courage are very properly chaſtiſed. He died on the 1ſt of Auguſt 1788, leaving behind him the character of a benevolent man among thoſe who were beſt acquainted with him; a character which, from the manner he ſpeaks of his connections, he probably deſerved.

SHEEP, in *Zoology*. See OVIS and WOOL.

Sheep ſerve a wonderful variety of purpoſes. 1

Amongſt the various animals with which Divine Providence has ſtored the world for the uſe of man, none is to be found more innocent, more uſeful, or more valuable, than the ſheep. The ſheep ſupplies us with food and clothing, and finds ample employment for our poor at all times and ſeaſons of the year, whereby a variety of manufactures of woollen cloth is carried on without interruption to domeſtic comfort and loſs to friendly ſociety or injury to health, as is the caſe with many other occupations. Every lock of wool that grows on its back becomes the means of ſupport to ſtaplers, dyers, pickers, ſcourers, ſcriblers, carders, combers, ſpinners, ſpoolers, warpers, queelers, weavers, fullers, tuckers, burlers, ſhearmen, preſſers, clothiers, and packers, who, one after another, tumble and toſs, and twiſt, and bake, and boil, this raw material, till they have each extracted a livelihood out of it; and then comes the merchant, who, in his turn, ſhips it (in its higheſt ſtate of improvement) to all quarters of the globe, from whence he brings back every kind of riches to his country, in return for this valuable commodity which the ſheep affords.

Beſides this, the uſeful animal, after being deprived of his coat, produces another againſt the next year; and when we are hungry, and kill him for food, he gives us his ſkin to employ the fell-mongers and parchment-makers, who ſupply us with a durable material for ſecuring our eſtates, rights, and poſſeſſions; and if our enemies take the field againſt us, ſupplies us with a powerful inſtrument for rouſing our courage to repel their attacks. When the parchment-maker has taken as much of the ſkin as he can uſe, the glue-maker comes after and picks up every morſel that is left, and therewith ſupplies a material for the carpenter and cabinet-maker, which they cannot do without, and which is eſſentially neceſſary before we can have elegant furniture in our houſes; tables, chairs, looking-glaſſes, and a hundred other articles of convenience: and when the winter nights come on, while we are deprived of the cheering light of the ſun, the ſheep ſupplies us with an artificial mode of light, whereby we preſerve every pleaſure of domeſtic ſociety, and with whoſe aſſiſtance we can continue our work, or write or read, and improve

our

Sheep. our minds, or enjoy the ſocial mirth of our tables. Another part of the ſlaughtered animal ſupplies us with an ingredient neceſſary for making good common ſoap, a uſeful ſtore for producing cleanlineſs in every family, rich or poor. Neither need the horns be thrown away; for they are converted by the button-makers and turners into a cheap kind of buttons, tips for bows, and many uſeful ornaments. From the very trotters an oil is extracted uſeful for many purpoſes, and they afford good food when baked in an oven.

Even the bones are uſeful alſo; for by a late invention of Dr Higgins, they are found, when reduced to aſhes, to be an uſeful and eſſential ingredient in the compoſition of the fineſt artificial ſtone in ornamental work for chimney-pieces, cornices of rooms, houſes, &c. which renders the compoſition more durable by effectually preventing its cracking (A).

If it is objected to the meek inoffenſive creature, that he is expenſive while living, in eating up our graſs, &c. it may be anſwered that it is quite the contrary; for he can feed where every other animal has been before him and grazed all they could find; and that if he takes a little graſs on our downs or in our fields, he amply repays us for every blade of graſs in the richneſs of the manure which he leaves behind him. He protects the hands from the cold wintry blaſt, by providing them with the ſofteſt leather gloves. Every gentleman's library is alſo indebted to him for the neat binding of his books, for the ſheath of his ſword, and for caſes for his inſtruments; in ſhort, not to be tedious in mentioning the various uſes of leather, there is hardly any furniture or utenſil of life but the ſheep contributes to render either more uſeful, convenient, or ornamental.

As the ſheep is ſo valuable an animal, every piece of information concerning the proper method of managing it muſt be of importance. It will not therefore be uſeleſs or unentertaining to give ſome account of the manner of managing ſheep in Spain, a country famous for producing the beſt wool in the world.

2 Account of the Spaniſh ſheep

In Spain there are two kinds of ſheep: the coarſe-woolled ſheep, which always remain in their native country, and are houſed every night in winter; and the fine-woolled ſheep, which are always in the open air, and travel every ſummer from the cool mountains of the northern parts of Spain, to feed in winter on the ſouthern warm plains of Andaluſia, Mancha, and Eſtremadura. Of theſe latter, it appears from accurate computations, that there are about five millions (B); and that the wool and fleſh of a flock of 10,000 ſheep produced yearly about 24 reals a-head, about the value of 12 Engliſh ſixpences, one of which belongs to the owner, three to the king, and the other eight are allowed for the expences of paſture, tyther, ſhepherds, dogs, ſalt, ſhearing, &c. Ten thouſand ſheep form a flock, which is divided into ten tribes, under the management of one perſon, who has abſolute dominion over fifty ſhepherds and fifty dogs. Sheep.

3 Of Segovia,

M. Bourgoanne, a French gentleman, who reſided many years in Spain, and directed his inquiries chiefly to the civil government, trade, and manufactures, of that country, gives the following account of the wandering ſheep of Segovia. "It is (ſays he) in the neighbouring mountains that a part of the wandering ſheep feed during the fine ſeaſon. They leave them in the month of October, paſs over thoſe which ſeparate the two Caſtiles, croſs New Caſtile, and diſperſe themſelves in the plains of Eſtramadura and Andaluſia. For ſome years paſt thoſe of the two Caſtiles, which are within reach of the Sierra-Morena, go thither to paſs the winter; which, in that part of Spain, is more mild; the length of their day's journey is in proportion to the paſture they meet with. They travel in flocks from 1000 to 1200 in number, under the conduct of two ſhepherds; one of whom is called the *Mayoral*, the other the *Zagal*. When arrived at the place of their deſtination, they are diſtributed in the paſtures previouſly aſſigned them. They return in the month of April; and whether it be habit or natural inſtinct that draws them towards the climate, which at this ſeaſon becomes moſt proper for them, the inquietude which they manifeſt might, in caſe of need, ſerve as an almanac to their conductors." *Bourgoanne's Travels*, vol. i. p. 53.

Mr Arthur Young, in that patriotic work which he conducted with great induſtry and judgement, the Annals of Agriculture, gives us a very accurate and intereſting account of the Pyrenean or Catalonian ſheep.

4 Of Catalonia. *Annals of Agriculture*, vol. viii. p. 195.

"On the northern ridge, bearing to the weſt, are the paſtures of the Spaniſh flocks. This ridge is not, however, the whole; there are two other mountains, quite in a different ſituation, and the ſheep travel from one to another as the paſturage is ſhort or plentiful. I examined the ſoil of theſe mountain paſtures, and found it in general ſtony; what in the weſt of England would be

(A) Any curious perſon would be much entertained to ſee the manufactory of bone-aſh, now (about 1794) carried on by Mr Miniſh of White-chapel, New Road, wherein the bones of ſheep and cows undergo many ingenious proceſſes. 1. There is a mill to break them; 2. A cauldron to extract their oil, marrow, and fat; 3. A reverberatory to heat them red hot; 4. An oven for thoſe bones to moulder to aſhes; 5. A ſtill to collect the fumes of the burnt bones into a brown fluid, from whence hartſhorn is made; 6. Furnaces for making parts thereof into Glauber's ſalts; 7. A ſand heat containing twelve jars, for collecting a cryſtallizing vapour into ſal-ammoniac.

(B) In the 16th century the travelling ſheep were eſtimated at ſeven millions: under Phillip III. the number was diminiſhed to two millions and a half. Uſtariz, who wrote at the beginning of the 18th century, made it amount to four millions. The general opinion is, that at preſent it does not exceed five millions. If to this number the eight millions of ſtationary ſheep be added, it will make nearly thirteen millions of animals, all managed contrary to the true intereſts of Spain, for the advantage of a few individuals. For the proprietors of ſtationary flocks alſo have privileges which greatly reſemble thoſe of the members of the Meſta. According to Arriquebar, Spain contains eight millions of fine-woolled ſheep, ten millions of coarſe-woolled, and five hundred thouſand bulls, oxen, and cows.

Sheep. be called a *ſtone braſh*, with ſome mixture of loam, and in a few places a little peaty. The plants are many of them untouched by the ſheep; many ferns, narciſſus, violets, &c. but burnet (*poterium ſanguiſorba*) and the narrow-leaved plantain (*plantago lanceolata*) were eaten, as may be ſuppoſed, cloſe. I looked for trefoils, but found ſcarcely any: it was very apparent that ſoil and peculiarity of herbage had little to do in rendering theſe heights proper for ſheep. In the northern parts of Europe, the tops of mountains half the height of theſe (for we were above ſnow in July) are bogs, all are ſo which I have ſeen in our iſlands, or at leaſt the proportion of dry land is very trifling to that which is extremely wet: Here they are in general very dry. Now a great range of dry land, let the plants be what they may, will in every country ſuit ſheep. The flock is brought every night to one ſpot, which is ſituated at the end of the valley on the river I have mentioned, and near the port or paſſage of Picada: it is a level ſpot ſheltered from all winds. The ſoil is eight or nine inches deep of old dung, not at all incloſed: from the freedom from wood all around, it ſeems to be choſen partly for ſafety againſt wolves and bears. Near it is a very large ſtone, or rather rock, fallen from the mountain. This the ſhepherds have taken for a ſhelter, and have built a hut againſt it; their beds are ſheep ſkins, and their door ſo ſmall that they crawl in. I ſaw no place for fire; but they have it, ſince they dreſs here the fleſh of their ſheep, and in the night ſometimes keep off the bears, by whirling fire-brands: four of them belonging to the flock mentioned above lie here. I viewed their flock very carefully, and by means of our guide and interpreter, made ſome inquiries of the ſhepherds, which they anſwered readily, and very civilly. A Spaniard at Venaſque, a city in the Pyrenees, gives 600 livres French (the livre is 10½d. Engliſh) a-year for the paſturage of this flock of 2000 ſheep. In the winter he ſends them into the lower parts of Catalonia, a journey of 12 or 13 days, and when the ſnow is melted in the ſpring, they are conducted back again. They are the whole year kept in motion, and moving from ſpot to ſpot, which is owing to the great range they everywhere have of paſture. They are always in the open air, never houſed or under cover, and never taſte of any food but what they can find on the hills.

"Four ſhepherds, and from four to ſix large Spaniſh dogs, have the care of this flock: the latter are in France called of the *Pyrenees breed*; they are black and white, of the ſize of a large wolf, a large head and neck, armed with collars ſtuck with iron ſpikes. No wolf can ſtand againſt them; but bears are more potent adverſaries: if a bear can reach a tree, he is ſafe; he riſes on his hind legs, with his back to the tree, and ſets the dogs at defiance. In the night the ſhepherds rely entirely on their dogs; but on hearing them bark are ready with fire-arms, as the dogs rarely bark if a bear is not at hand. I was ſurpriſed to find that they are fed only with bread and milk. The head ſhepherd is paid 120 livres a-year wages and bread; the others 80 livres and bread. But they are allowed to keep goats, of which they have many which they milk every day. Their food is milk and bread, except the fleſh of ſuch ſheep or lambs as accidents give them. The head ſhepherd keeps on the mountain top, or an elevated ſpot, from whence he can the better ſee around while the flock traverſes the declivities. In doing this the ſheep are expoſed to great danger in places that are ſtony; for by walking among the rocks, and eſpecially the goats, they move the ſtones, which, rolling down the hills, acquire an accelerated force enough to knock a man down, and ſheep are often killed by them; yet we ſaw how alert they were to avoid ſuch ſtones, and cautiouſly on their guard againſt them. I examined the ſheep attentively. They are in general polled, but ſome have horns; which in the rams turn backwards behind the ears and project half a circle forward; the ewes horns turn alſo behind the ears, but do not project: the legs white or reddiſh; ſpeckled faces, ſome white, ſome reddiſh; they would weigh fat, I reckon, on an average, from 15 lb. to 18 lb. a quarter. Some tails ſhort, ſome left long. A few black ſheep among them: ſome with a very little tuft of wool on their foreheads. On the whole they reſemble thoſe on the South Downs; their legs are as ſhort as thoſe of that breed; a point which merits obſervation, as they travel ſo much and ſo well. Their ſhape is very good, round ribs and flat ſtraight backs; and would with us be reckoned handſome ſheep; all in good order and fleſh. In order to be ſtill better acquainted with them, I deſired one of the ſhepherds to catch a ram for me to feel, and examine the wool, which I found very thick and good of the carding ſort, as may be ſuppoſed. I took a ſpecimen of it, and alſo of a hoggit, or lamb of laſt year. In regard to the mellow ſoftneſs under the ſkin, which, in Mr Bakewell's opinion, is a ſtrong indication of a good breed, with a diſpoſition to fatten, he had it in a much ſuperior degree to many of our Engliſh breeds, to the full as much ſo as the South Downs, which are for that point the beſt ſhort-woolled ſheep which I know in England. The fleece was on his back, and weighed, as I gueſſed, about 8 lb. Engliſh; but the average, they ſay, of the flock is from four to five, as I calculated by reducing the Catalonian pound of 12 oz. to ours of 16, and is all ſold to the French at 30s. the lb. French. This ram had the wool of the back part of his neck tied cloſe, and the upper tuft tied a ſecond knot by way of ornament; nor do they ever ſhear this part of the fleece for that reaſon: we ſaw ſeveral in the flock with this ſpecies of decoration. They ſaid that this ram would ſell in Catalonia for 20 livres. A circumſtance which cannot be too much commended, and deſerves univerſal imitation, is the extreme docility they accuſtom them to. When I deſired the ſhepherd to catch one of his rams, I ſuppoſed he would do it with his crook, or probably not be able to do it at all; but he walked into the flock, and ſingling out a ram and a goat, bid them follow him, which they did immediately; and he talked to them while they were obeying him, holding out his hand as if to give them ſomething. By this method he brought me the ram, which I caught, and held without difficulty."

5 What ſheep produce the beſt wool.

The beſt ſort of ſheep for fine wool are thoſe bred in Herefordſhire, Devonſhire, and Worceſterſhire; but they are ſmall, and black-faced, and bear but a ſmall quantity. Warwick, Leiceſterſhire, Buckingham, and Northamptonſhire, breed a large-boned ſheep, of the beſt ſhape and deepeſt wool we have. The marſhes of Lincolnſhire breed a very large kind of ſheep, but their wool is not good, unleſs the breed be mended by bringing in ſheep of other counties among them, which is a ſcheme of late very profitably followed there. In this

Sheep. this county, it is no uncommon thing to give fifty guineas for a ram, and a guinea for the admiſſion of an ewe to one of theſe valuable males, or twenty guineas for the uſe of it for a certain number of ewes during one ſeaſon. Suffolk alſo breeds a very valuable kind of ſheep. The northern counties in general breed ſheep with long but hairy wool: however, the wool which is taken from the neck and ſhoulders of the Yorkſhire ſheep is uſed for mixing with Spaniſh wool in ſome of their fineſt cloths.

Wales bears a ſmall hardy kind of ſheep, which has the beſt taſted fleſh, but the worſt wool of all. Nevertheleſs it is of more extenſive uſe than the fineſt Segovian fleeces; for the benefit of the flannel manufacture is univerſally known. The ſheep of Ireland vary like thoſe of Great Britain; thoſe of the ſouth and eaſt being large and their fleſh rank: thoſe of the north and the mountainous parts ſmall and their fleſh ſweet. The fleeces in the ſame manner differ in degrees of value. Scotland breeds a ſmall kind, and their fleeces are coarſe.

But the new Leiceſterſhire breed is the moſt faſhionable, and of courſe the moſt profitable breed in the iſland. Joſeph Altom of Clifton, who raiſed himſelf from a plough-boy, was the firſt who diſtinguiſhed himſelf in the midland counties of England for a ſuperior breed of ſheep. How he improved his breed is not known; but it was cuſtomary for eminent farmers in his time to go to Clifton in ſummer to chooſe and purchaſe ram lambs, for which they paid two or three guineas. This man was ſucceeded by Mr Bakewell; and it may reaſonably be ſuppoſed that the breed, by means of Altom's ſtock, had paſſed the firſt ſtage of improvement before Mr Bakewell's time. Still, however, it muſt be acknowledged, that the Leiceſterſhire breed of ſheep owes its preſent high ſtate of improvement to the ability and care of Mr Bakewell.

6 Account of Mr Bakewell's breed. *Marſhall's Midland Counties*, vol. i. p. 382.

"The manner in which Mr Bakewell raiſed his ſheep to the degree of celebrity in which they deſervedly ſtand, is, notwithſtanding the recentneſs of the improvement, and its being done in the day of thouſands now living, a thing in diſpute; even among men high in the profeſſion, and living in the very diſtrict in which the improvement has been carried on!

7 How it is ſuppoſed he improved it.

"Some are of opinion that he effected it by a croſs with the Wiltſhire breed; an improbable idea, as their form altogether contradicts it: others, that the Ryeland breed were uſed for this purpoſe; and with ſome ſhow of probability. If any croſs whatever was uſed the Ryeland breed, whether we view the form, the ſize, the wool, the fleſh, or the fatting quality, is the moſt probable inſtrument of improvement.

"Theſe ideas, however, are regiſtered merely as matters of opinion. It is more than probable that Mr Bakewell alone is in poſſeſſion of the ſeveral minutiæ of improvement; and the public can only hope that at a proper time the facts may be communicated for the direction of future improvers.

"Whenever this ſhall take place, it will moſt probably come out that no croſs with any alien breed whatever has been uſed; but that the improvement has been effected by ſelecting individuals from kindred breeds; from the ſeveral breeds or varieties of long-woolled ſheep, with which Mr Bakewell was ſurrounded on almoſt every ſide, and by breeding, *inandin* (c), with this ſelection: ſolicitouſly ſeizing the ſuperior accidental varieties produced; aſſociating theſe varieties; and ſtill continuing to ſelect, with judgement, the ſuperior individuals. Sheep.

8 Deſcription of his ewes and wedders.

"It now remains to give a deſcription of the ſuperior claſs of individuals of this breed, eſpecially ewes and wedders, in full condition, but not immoderately fat. The rams will require to be diſtinguiſhed afterwards.

"The head is long, ſmall, and hornleſs, with ears ſomewhat long, and ſtanding backward, and with the noſe ſhooting forward. The neck thin, and clean toward the head; but taking a conical form; ſtanding low, and enlarging every way at the baſe; the fore-end altogether ſhort. The boſom broad, with the ſhoulders, ribs, and chine extraordinary full. The loin broad, and the back level. The haunches comparatively full toward the hips, but light downward; being altogether ſmall in proportion to the fore-parts. The legs, at preſent, of a moderate length; with the bone extremely fine. The bone throughout remarkably light. The carcaſe, when fully fat, takes a remarkable form; much wider than it is deep, and almoſt as broad as it is long. Full on the ſhoulder, wideſt on the ribs, narrowing with a regular curve towards the tail; approaching the form of the turtle nearer perhaps than any other animal. The pelt is thin, and the tail ſmall. The wool is ſhorter than long wools in general, but much longer than the middle wools; the ordinary length of ſtaple five to ſeven inches, varying much in fineneſs and weight."

9 Fatten remarkably well.

This breed ſurpaſſes every other in beauty of form; they are full and weighty in the fore quarters; and are remarkable for ſmallneſs of bone. Mr Marſhall, who has been of ſo much benefit to agriculture and this country by his publications, informs us, in his Rural Economy of the Midland Counties, that he has ſeen a rib of a ſheep of this breed contraſted with one of a Norfolk ſheep: the diſparity was ſtriking; the latter nearly twice the ſize; while the meat which covered the former was three times the thickneſs: conſequently the proportion of meat to bone was in the one incomparably greater than in the other. Therefore, in this point of view, the improved breed has a decided preference: for ſurely while mankind continue to eat fleſh and throw away bone, the former muſt be, to the conſumer at leaſt, the more valuable.

The criterions of good and bad fleſh while the animal is alive differ in different ſpecies, and are not properly ſettled in the ſame ſpecies. One ſuperior breeder is of opinion, that if the fleſh is not looſe, it is of courſe good; holding, that the fleſh of ſheep is never found in a ſtate of hardneſs, like that of ill-fleſhed cattle: while others make a fourfold diſtinction of the fleſh of ſheep; as looſeneſs, mellowneſs, firmneſs, hardneſs: conſidering the firſt and the laſt equally exceptionable, and the ſecond and third equally deſirable; a happy mixture of the two being deemed the point of perfection.

The

(c) *Inandin* is a term uſed in the midland counties of England to expreſs breeding from the ſame family.

SHIP.

A FIRST RATE SHIP of WAR with Rigging &c. at Anchor.

Fig. 1.



E. Mitchell fculp.



Fig. 3.



Fig. 4.

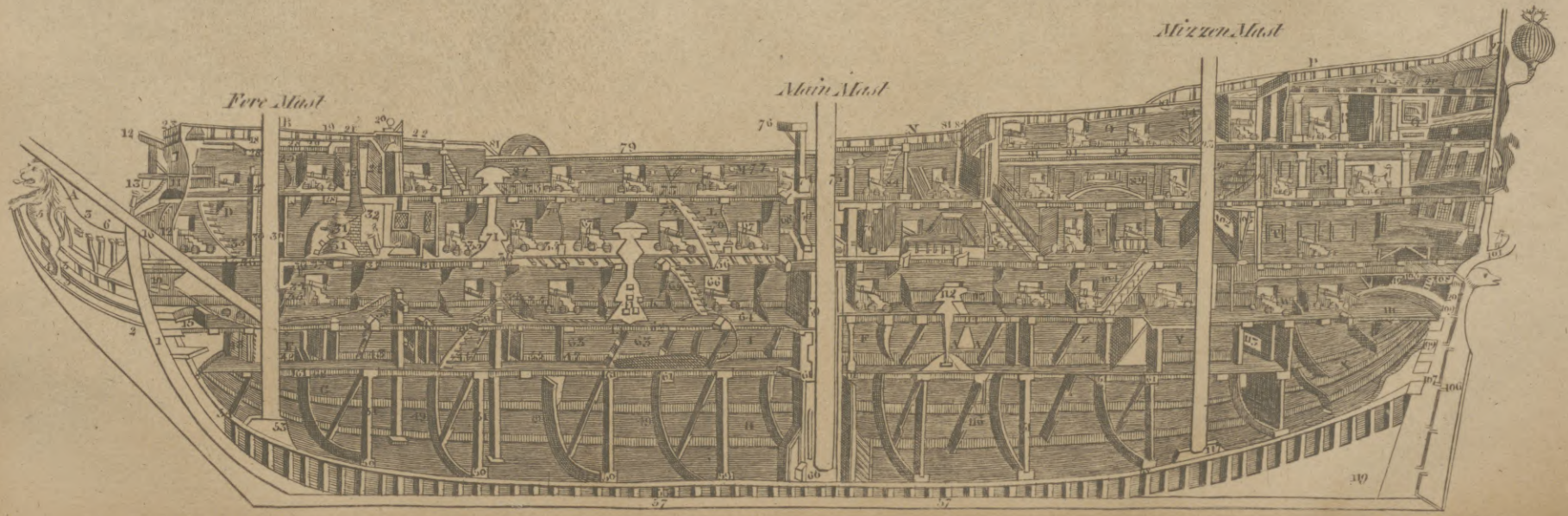


Fig. 5.



Fig. 2.

The Section of a First Rate Ship of War, Shewing its various Timbers and Apartments.



E. Mitchell fecit



SHIP.

Fig. 8.



Fig. 7.

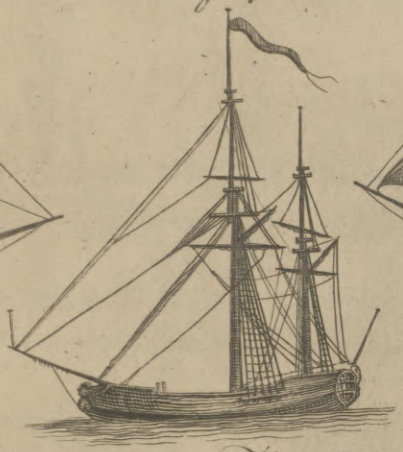


Fig. 6.



Fig. 9.



Fig. 12.



Fig. 10.



Fig. 14.

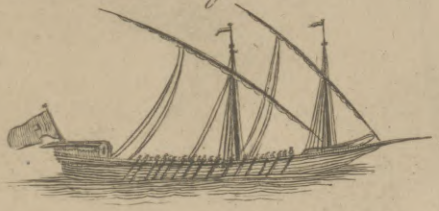


Fig. 11.



Fig. 13.



E. Mitchell Sculpt.

Machine for drawing

Ship Bolts.

Plate CCCCLXXXIII

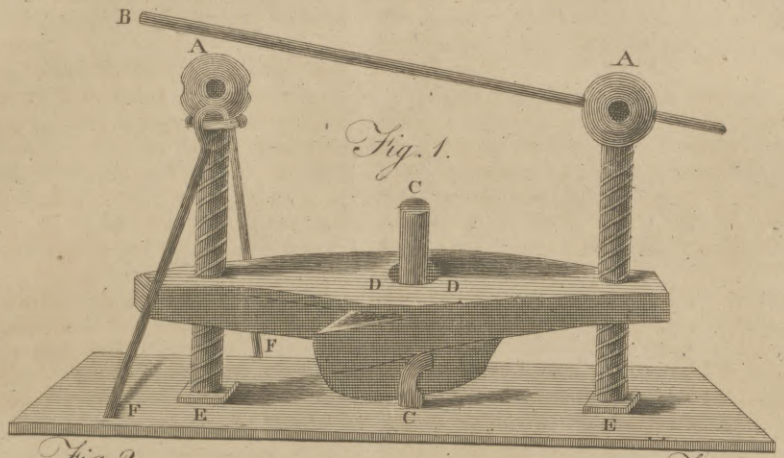


Fig. 1.

Fig. 2.

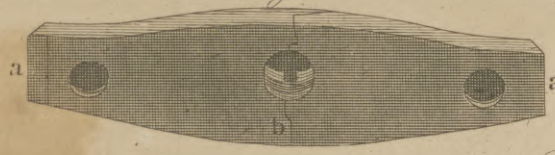


Fig. 3.

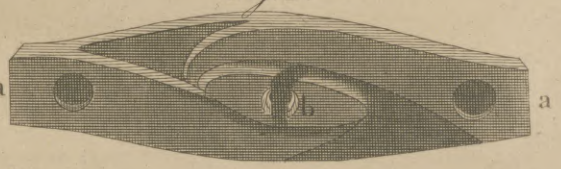
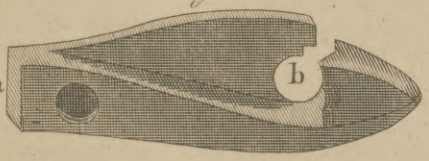


Fig. 4.



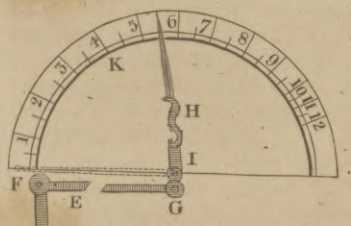


Fig. 5.

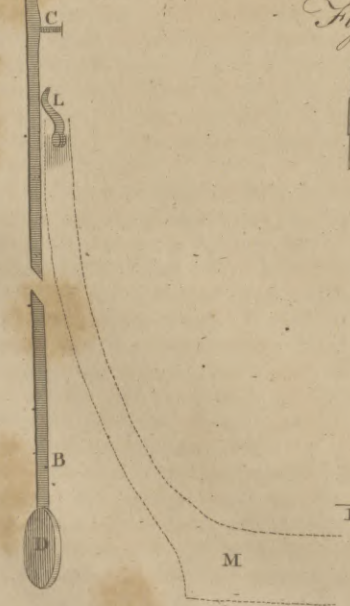


Fig. 6.



Fig. 7.



Fig. 8.

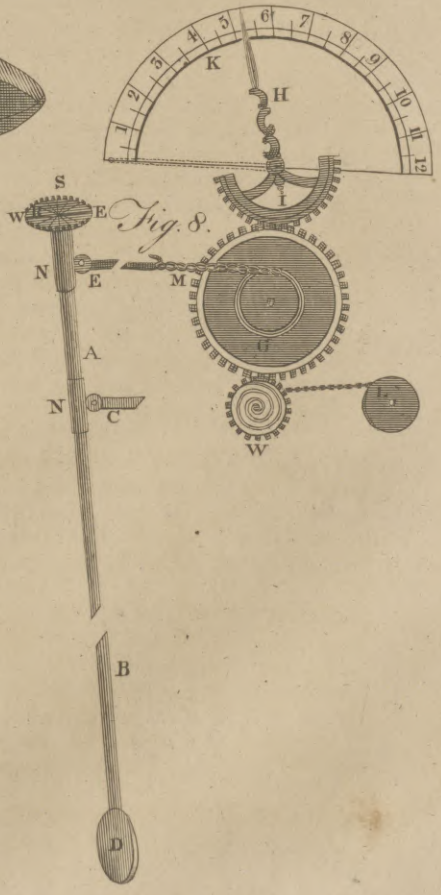
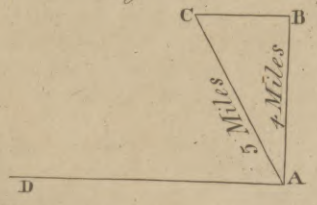


Fig. 9.



E. Mitchell *sculpt.*

Sheep.

The flesh of sheep, when slaughtered, is well known to be of various qualities. Some is composed of large coarse grains, interspersed with wide empty pores like a sponge: others, of large grains, with wide pores filled with fat; others, of fine close grains, with smaller pores filled with fat: and a fourth, of close grains, without any intermixture of fatness.

The flesh of sheep, when dressed, is equally well known to possess a variety of qualities: some mutton is coarse, dry, and insipid; a dry sponge, affording little or no gravy of any colour. Another sort is somewhat firmer, imparting a light-coloured gravy only. A third plump, short, and palatable; affording a mixture of white and red gravy. A fourth likewise plump and well-flavoured, but discharging red gravy, and this in various quantities.

It is likewise observable, that some mutton, when dressed, appears covered with a thick, tough, parchment-like integument; others with a membrane comparatively fine and flexible. But these, and some of the other qualities of mutton, may not be wholly owing to breed, but in part to the age and the state of fatness at the time of slaughter. Examined in this light, whether we consider the degree of fatness, or their natural propensity to a state of fatness, even at an early age, the improved breed of Leicestershire sheep appears with many superior advantages.

The degree of fatness to which the individuals of this breed are capable of being raised, will perhaps appear incredible to those who have not had an opportunity of being convinced by their own observation. "I have seen wedders (says Mr Marshall) of only two shear (two or three years old) so loaded with fat as to be scarcely able to make a run; and whose fat lay so much without the bone, it seemed ready to be shaken from the ribs on the smallest agitation.

Midland Counties, vol. i. p. 398.

"It is common for the sheep of this breed to have such a projection of fat upon the ribs, immediately behind the shoulder, that it may be easily gathered up in the hand, as the flank of a fat bullock. Hence it has gained, in technical language, the name of the *fore-flank;* a point which a modern breeder never fails to touch in judging of the quality of this breed of sheep.

"What is, perhaps, still more extraordinary, it is not rare for the rams, at least of this breed, to be 'cracked on the back;' that is, to be cloven along the top of the chine, in the manner fat sheep generally are upon the rump. This mark is considered as an evidence of the best blood.

"Extraordinary, however, as are these appearances while the animals are living, the facts are still more striking after they are slaughtered. At Litchfield, in February 1785, I saw a fore quarter of mutton, fatted by Mr Princep of Croxall, and which measured upon the ribs four inches of fat. It must be acknowledged, however, that the Leicestershire breed do not produce so much wool as most other long-woolled sheep."

As the practice of letting rams by the season is now become profitable, it may be useful to mention the method of rearing them.

10 How the rams are reared.

"The principal ram-breeders save annually twenty, thirty, or perhaps forty ram lambs; castration being seldom applied, in the first instance, to the produce of a valuable ram, for in the choice of these lambs they are led more by blood or parentage, than by form; on which, at an early age, little dependence can be placed. Their treatment from the time they are weaned, in July or August, until the time of shearing, the first week in June, consists in giving them every indulgence of keep, in order to push them forward for the show; it being the common practice to let such as are fit to be let the first season, while they are yet yearlings—provincially 'sharhogs.'

Sheep.

"Their first pasture, after weaning, is pretty generally, I believe, clover that has been mown early, and has got a second time into head; the heads of clover being considered as a most forcing food of sheep. After this goes off, turnips, cabbages, colewort, with hay, and (report says) with corn. But the use of this the breeders severally deny, though collectively they may be liable to the charge.

"Be this as it may, something considerable depends on the *art of making up*, not lambs only, but rams of all ages. Fat, like charity, covers a multitude of faults; and besides, is the best evidence of their fatting quality which their owners can produce (*i. e.* their natural propensity to a state of fatness), while in the fatness of the sharhogs is seen their degree of inclination to fat at an early age.

"Fatting quality being the one thing needful in grazing stock, and being found, in some considerable degree at least, to be hereditary, the fattest rams are of course the best; though other attachments, well or ill placed, as to form or fashionable points, will perhaps have equal or greater weight in the minds of some men, even in this enlightened age. Such shearlings as will not make up sufficiently as to form and fatness, are either kept on to another year to give them a fair chance, or are castrated, or butchered while sharhogs."

11 What sums Mr Bakewell received for letting them.

From the first letting, about 40 years ago, to the year 1780, the prices kept gradually rising from fifteen shillings to a guinea, and from one to ten. In 1780 Mr Bakewell let several at ten guineas each; and, what is rather inexplicable, Mr Parkinson of Quarndon let one the same year for twenty-five guineas; a price which then astonished the whole country.

From that time to 1786 Mr Bakewell's stock rose rapidly from ten to a hundred guineas; and that year he let two thirds of one ram (reserving one third of the usual number of ewes to himself) to two principal breeders, for a hundred guineas each, the entire services of the ram being rated at three hundred guineas! Mr Bakewell making that year, by letting twenty rams only, more than a thousand pounds!

Since that time the prices have been still rising. Four hundred guineas have been repeatedly given. Mr Bakewell, this year (1789) makes, says Mr Marshall, twelve hundred guineas by three rams (brothers, we believe); two thousand of seven; and of his whole letting, full three thousand guineas!

Beside this extraordinary sum made by Mr Bakewell, there are six or seven other breeders who make from five hundred to a thousand guineas each. The whole amount of moneys produced that year in the midland counties, by letting rams of the modern breed for one season only, is estimated, by those who are adequate to the subject, at the almost incredible sum of ten thousand pounds.

Rams previous to the season are reduced from the cumbrous fat state in which they are shown. The usual

Sheep.

time of ſending them out is the middle of September. They are conveyed in carriages of two wheels with ſprings, or hung in ſlings, 20 or 30 miles a-day, ſometimes to the diſtance of 200 or 300 miles. They are not turned looſe among the ewes, but kept apart in a ſmall incloſure, where a couple of ewes only are admitted at once. When the ſeaſon is over, every care is taken to make the rams look as fat and handſome as poſſible.

12 The treatment of the rams and choice of the ewes.

In the choice of ewes the breeder is led by the ſame criterions as in the choice of rams. Breed is the firſt object of conſideration. Excellency, in any ſpecies or variety of live-ſtock, cannot be attained with any degree of certainty, let the male be ever ſo excellent, unleſs the females employed likewiſe inherit a large proportion of the genuine blood, be the ſpecies or variety what it may. Hence no prudent man ventures to give the higher prices for the Diſhley rams, unleſs his ewes are deeply tinctured with the Diſhley blood. Next to breed is fleſh, fat, form, and wool.

After the lambs are weaned, the ewes are kept in common feeding places, without any alteration of paſture, previous to their taking the ram. In winter they are kept on graſs, hay, turnips, and cabbages. As the heads of the modern breed are much finer than moſt others, the ewes lamb with leſs difficulty.

The female lambs, on being weaned, are put to good keep, but have not ſuch high indulgence ſhown them as the males, the prevailing practice being to keep them from the ram the firſt autumn.

At weaning time, or previouſly to the admiſſion of the ram, the ewes are culled, to make room for the thaves or ſhearlings, whoſe ſuperior blood and faſhion intitle them to a place in the breeding flock. In the work of culling, the ram-breeder and the mere grazier go by ſomewhat different guides. The grazier's guide is principally age, ſeldom giving his ewes the ram after they are four ſhear. The ram-breeder, on the contrary, goes chiefly by merit; an ewe that has brought him a good ram or two is continued in the flock ſo long as ſhe will breed. There are inſtances of ewes having been prolific to the tenth or twelfth year; but in general the ewes of this breed go off at ſix or ſeven ſhear.

In the practice of ſome of the principal ram-breeders, the culling ewes are never ſuffered to go out of their hands until after they are ſlaughtered, the breeders not only fatting them, but having them butchered, on their premiſes. There are others, however, who ſell them; and ſometimes at extraordinary prices. Three, four, and even ſo high as ten guineas each, have been given for theſe outcaſts.

There are in the flocks of ſeveral breeders ewes that would fetch at auction twenty guineas each. Mr Bakewell is in poſſeſſion of ewes which, if they were now put up to be ſold to the beſt bidder, would, it is eſtimated, fetch no leſs than fifty each, and perhaps, through the preſent ſpirit of contention, much higher prices.

13 Inſtructions for purchaſing ſheep.

The following inſtructions for purchaſing ſheep, we hope, will be acceptable to our country readers.—The farmer ſhould always buy his ſheep from a worſe land than his own, and they ſhould be big-boned, and have a long greaſy wool, curling cloſe and well. Theſe ſheep always breed the fineſt wool, and are alſo the moſt approved of by the butcher for ſale in the market. For the choice of ſheep to breed, the ram muſt be young, and his ſkin of the ſame colour with his wool, for the lambs will be of the ſame colour with his ſkin. He ſhould have a large long body; a broad forehead, round, and well-riſing; large eyes; and ſtraight and ſhort noſtrils. The polled ſheep, that is, thoſe which have no horns, are found to be the beſt breeders. The ewe ſhould have a broad back; a large bending neck; ſmall, but ſhort, clean, and nimble legs; and a thick, deep wool covering her all over.

Sheep.

To know whether they be ſound or not, the farmer ſhould examine the wool that none of it be wanting, and ſee that the gums be red, the teeth white and even, and the briſket-ſkin red, the wool firm, the breath ſweet, and the feet not hot. Two years old is the beſt time for beginning to breed; and their firſt lambs ſhould not be kept too long, to weaken them by ſuckling, but be ſold as ſoon as conveniently may be. They will breed advantageouſly till they are ſeven years old. The farmers have a method of knowing the age of a ſheep, as a horſe's is known, by the mouth. When a ſheep is one ſhear, as they expreſs it, it has two broad teeth before; when it is two ſhear, it will have four; when three, ſix; and when four, eight. After this their mouths begin to break.

The difference of land makes a very great difference in the ſheep. The fat paſtures breed ſtraight tall ſheep, and the barren hills and downs breed ſquare ſhort ones; woods and mountains breed tall and ſlender ſheep; but the beſt of all are thoſe bred upon new-ploughed land and dry grounds. On the contrary, all wet and moiſt lands are bad for ſheep, eſpecially ſuch as are ſubject to be overflowed, and to have ſand and dirt left on them. The ſalt marſhes are, however, an exception to this general rule, for their ſaltneſs makes amends for their moiſture; ſalt, by reaſon of its drying quality, being of great advantage to ſheep.

14 When rams ought to be admitted to the ewes.

As to the time of putting the rams to the ewes, the farmer muſt conſider at what time of the ſpring his graſs will be fit to maintain them and their lambs, and whether he has turnips to do it till the graſs comes; for very often both the ewes and lambs are deſtroyed by the want of food; or if this does not happen, if the lambs are only ſtinted in their growth by it, it is an accident that they never recover. The ewe goes 20 weeks with lamb, and according to this it is eaſy to calculate the proper time. The beſt time for them to yean is in April, unleſs the owner has very forward graſs or turnips, or the ſheep are field ſheep. Where you have not incloſures to keep them in, then it may be proper they ſhould yean in January, that the lambs may be ſtrong by May-day, and be able to follow the dam over the fallows and water-furrows; but then the lambs that come ſo early muſt have a great deal of care taken of them, and ſo indeed ſhould all other lambs at their firſt falling, elſe while they are weak the crows and magpies will pick their eyes out.

When the ſheep are turned into fields of wheat or rye to feed, it muſt not be too rank at firſt, for if it be, it generally throws them into ſcourings. Ewes that are big ſhould be kept but bare, for it is very dangerous to them to be fat at the time of their bringing forth their young. They may be well fed, indeed, like cows, a fortnight beforehand, to put them in heart. Mortimer's Huſbandry, p. 243.

The

Sheep.

The feeding ſheep with turnips is one great advantage to the farmers. When they are made to eat turnips they ſoon fatten, but there is ſome difficulty in bringing this about. The old ones always refuſe them at firſt, and will ſometimes faſt three or four days, till almoſt famiſhed; but the young lambs fall to at once. The common way, in ſome places, of turning a flock of ſheep at large into a field of turnips, is very diſadvantageous, for they will thus deſtroy as many in a fortnight as would keep them a whole winter. There are three other ways of feeding them on this food, all of which have their ſeveral advantages.

15 The firſt way of feeding ſheep with turnips.

The firſt way is to divide the land by hurdles, and allow the ſheep to come upon ſuch a portion only at a time as they can eat in one day, and ſo advance the hurdles farther into the ground daily till all be eaten. This is infinitely better than the former random method; but they never eat them clean even this way, but leave the bottoms and outſides ſcooped in the ground: the people pull up theſe indeed with iron crooks, and lay them before the ſheep again, but they are commonly ſo fouled with the creature's dung and urine, and with the dirt from their feet, that they do not care for them; they eat but little of them, and what they do eat does not nouriſh them like the freſh roots.

16 The ſecond.

The ſecond way is by incloſing the ſheep in hurdles, as in the former; but in this they pull up all the turnips which they ſuppoſe the ſheep can eat in one day, and daily remove the hurdles over the ground whence they have pulled up the turnips: by this means there is no waſte, and leſs expence, for a perſon may in two hours pull up all thoſe turnips; the remaining ſhells of which would have employed three or four labourers a-day to get up with their crooks out of the ground trodden hard by the feet of the ſheep; and the worſt is, that as in the method of pulling up firſt, the turnips are eaten up clean, in this way, by the hook, they are waſted, the ſheep do not eat any great part of them, and when the ground comes to be tilled afterwards for a crop of corn, the fragments of the turnips are ſeen in ſuch quantities on the ſurface, that half the crop at leaſt ſeems to have been waſted.

17 The third, which is the beſt.

The third manner is to pull up the turnips, and remove them in a cart or waggon to ſome other place, ſpreading them on a freſh place every day; by this method the ſheep will eat them up clean, both root and leaves. The great advantage of this method is, when there is a piece of land not far off which wants dung more than that where the turnips grew, which perhaps is alſo too wet for the ſheep in winter, and then the turnips will, by the too great moiſture and dirt of the ſoil, ſometimes ſpoil the ſheep, and give them the rot. Yet ſuch ground will often bring forth more and larger turnips than dry land, and when they are carried off, and eaten by the ſheep on ploughed land, in dry weather, and on green ſward in wet weather, the ſheep will ſucceed much better; and the moiſt ſoil where the turnips grew not being trodden by the ſheep, will be much fitter for a crop of corn than if they had been fed with turnips on it. The expence of hurdles, and the trouble of moving them, are ſaved in this caſe, which will counterbalance at leaſt the expence of pulling the turnips and carrying them to the places where they are to be eaten. They muſt always be carried off for oxen.

18 Diſeaſes of ſheep.

The diſeaſes to which ſheep are ſubject are theſe, rot, red-water, foot-rot and hoving, ſcab, dunt, rickets, fly-ſtruck, flux, and burſting. Of each of theſe we ſhall give the beſt deſcription in our power, with the moſt approved remedies.

Sheep.

19 The rot.

The *rot*, which is a very pernicious diſeaſe, has of late engaged the attention of ſcientific farmers. But neither its nature nor its cauſe has yet been fully aſcertained. Some valuable and judicious obſervations have, however, been made upon it, which ought to be circulated, as they may perhaps, in many caſes, furniſh an antidote for this malignant diſtemper, or be the means of leading others to ſome more efficacious remedy. Some have ſuppoſed the rot owing to the quick growth of graſs or herbs that grow in wet places. Without premiſing, that all bounteous Providence has given to every animal its peculiar taſte, by which it diſtinguiſhes the food proper for its preſervation and ſupport, if not vitiated by fortuitous circumſtances, it ſeems very difficult to diſcover on philoſophical principles why the quick growth of graſs ſhould render it noxious, or why any herb ſhould at one ſeaſon produce fatal effects, by the admiſſion of pure water only into its component parts, which at other times is perfectly innocent, although brought to its utmoſt ſtrength and maturity by the genial influence of the ſun. Beſides, the conſtant practice of moſt farmers in the kingdom, who with the greateſt ſecurity feed their meadows in the ſpring, when the graſs ſhoots quick and is full of juices, militates directly againſt this opinion.

Mr Arthur Young aſcribes this diſeaſe to moiſture. In confirmation of this opinion, which has been generally adopted, we are informed, in the Bath Society papers*, by a correſpondent, that there was a paddock adjoining to his park which had for ſeveral years cauſed the rot in moſt of the ſheep which were put into it. In 1769 he drained it, and from that time his ſheep were free from this malady. But there are facts which render it doubtful that moiſture is the ſole cauſe. We are told, the dry limed land in Derbyſhire will produce the rot as well as water meadows and ſtagnant marſhes; and that in ſome wet grounds ſheep ſuſtain no injury for many weeks.

* Vol. I. art. xlvi.

20 Its cauſe,

Without attempting to enumerate other hypotheſes which the ingenious have formed on this ſubject, we ſhall purſue a different method in order to diſcover the cauſe. On diſſecting ſheep that die of this diſorder, a great number of inſects called *flukes* (ſee FASCIOLA) are found in the liver. That theſe flukes are the cauſe of the rot, therefore, is evident; but to explain how they come into the liver is not ſo eaſy. It is probable that they are ſwallowed by the ſheep along with their food while in the egg ſtate. The eggs depoſited in the tender germ are conveyed with the food into the ſtomach and inteſtines of the animals, whence they are received into the lacteal veſſels, carried off in the chyle, and paſs into the blood; nor do they meet with any obſtruction until they arrive at the capillary veſſels of the liver. Here, as the blood filtrates through the extreme branches, anſwering to thoſe of the *vena porta* in the human body, the ſecerning veſſels are too minute to admit the impregnated ova, which, adhering to the membrane, produce thoſe animalculæ that feed upon the liver and deſtroy the ſheep. They much reſemble the flat fiſh called plaice, are ſometimes as large as a ſilver two-pence, and are found both in the liver and in

Sheep. the pipe (anſwering to that of the *vena cava*) which conveys the blood from the liver to the heart.

The common and moſt obvious objection to that opinion is, that this inſect is never found but in the liver, or in ſome parts of the viſcera, of ſheep that are diſeaſed more or leſs; and that they muſt therefore be bred there. But this objection will loſe its force, when we conſider that many inſects undergo ſeveral changes, and exiſt under forms extremely different from each other. Some of them may therefore appear and be well known under one ſhape, and not known to be the ſame under a ſecond or third. The fluke may be the laſt ſtate of ſome aquatic animal which we at preſent very well know under one or other of its previous forms.

If this be admitted, it is eaſy to conceive that ſheep may, on wet ground eſpecially, take multitudes of theſe ova or eggs in with their food; and that the ſtomach and viſcera of the ſheep being a proper nidus for them, they of courſe hatch, and appearing in their fluke or laſt ſtate, feed on the liver of the animal, and occaſion this diſorder.

It is a ſingular fact, "that no ewe ever has the rot while ſhe has a lamb by her ſide." The reaſon of this may be, that the impregnated ovum paſſes into the milk, and never arrives at the liver. The rot is fatal to ſheep, hares, and rabbits, and ſometimes to calves; but never infeſts animals of a larger ſize.

21 and moſt approved cures.

Miller ſays that parſley is a good remedy for the rot in ſheep. Perhaps a ſtrong decoction of this plant, or the oil extracted from its ſeeds, might be of ſervice. Salt is alſo a uſeful remedy. It ſeems to be an acknowledged fact, that ſalt marſhes never produce the rot. Salt indeed is pernicious to moſt inſects. Common ſalt and water expel worms from the human body; and ſea-weed, if laid in a garden, will drive away inſects; but if the ſalt is ſeparated by ſteeping it in the pureſt ſpring-water for a few days, it abounds with animalculæ of various ſpecies.

Liſle, in his book of huſbandry, informs us of a farmer who cured his whole flock of the rot by giving each ſheep a handful of Spaniſh ſalt for five or ſix mornings ſucceſſively. The hint was probably taken from the Spaniards, who frequently give their ſheep ſalt to keep them healthy. On ſome farms perhaps the utmoſt caution cannot always prevent this diſorder. In wet and warm ſeaſons the prudent farmer will remove his ſheep from the lands liable to rot. Thoſe who have it not in their power to do this may give each ſheep a ſpoonful of common ſalt, with the ſame quantity of flour, in a quarter of a pint of water, once or twice a-week. At the commencement of the rot the ſame remedy given four or five mornings ſucceſſively will in all probability effect a cure. The addition of the flour and water, it is ſuppoſed, not only abates the pungency of the ſalt, but diſpoſes it to mix with the chyle in a more gentle and efficacious manner.

A farmer of a conſiderable lordſhip in Bohemia viſiting the hot-wells of Carlſbad, related how he preſerved his flocks of ſheep from the mortal diſtemper which raged in the wet year 1760, of which ſo many periſhed. His preſervative was very ſimple and very cheap: "He fed them every night, when turned under a ſhed, cover, or ſtables, with haſhed fodder ſtraw; and, by eating it greedily, they all eſcaped." Sheep.

22 Red water.

"*Red water* is a diſorder moſt prevalent on wet grounds. I have heard (ſays Mr Arthur Young) that it has ſometimes been cured by tapping, as for a dropſy. This operation is done on one ſide of the belly towards the flank, juſt below the wool.

23 Foot-rot.

"The *foot-rot* and *hoving*, which is very common on low fenny grounds, is cured by keeping the part clean, and lying at reſt in a dry paſture."

24 Scab.

The *ſcab* is a cutaneous diſeaſe owing to an impurity of the blood, and is moſt prevalent in wet lands or in rainy ſeaſons. It is cured by tobacco-water, brimſtone, and alum, boiled together, and then rubbed over the ſheep. If only partial, tar and greaſe may be ſufficient. But the ſimpleſt and moſt efficacious remedy for this diſeaſe was communicated to the Society for the Encouragement of Arts, &c. by Sir Joſeph Banks.

25 Remedy recommended by Sir Joſeph Banks.

"Take one pound of quickſilver, half a pound of Venice turpentine, half a pint of oil of turpentine, and four pounds of hogs lard (c). Let them be rubbed in a mortar till the quickſilver is thoroughly incorporated with the other ingredients; for the proper mode of doing which, it may be proper to take the advice, or even the aſſiſtance, of ſome apothecary or other perſon uſed to make ſuch mixtures.

"The method of uſing the ointment is this: Beginning at the head of the ſheep, and proceeding from between the ears along the back to the end of the tail, the wool is to be divided in a furrow till the ſkin can be touched; and as the furrow is made, the finger ſlightly dipped in the ointment is to be drawn along the bottom of it, where it will leave a blue ſtain on the ſkin and adjoining wool: from this furrow ſimilar ones muſt be drawn down the ſhoulders and thighs to the legs, as far as they are woolly; and if the animal is much infected, two more ſhould be drawn along each ſide parallel to that on the back, and one down each ſide between the fore and hind legs.

"Immediately after being dreſſed, it is uſual to turn the ſheep among other ſtock, without any fear of the infection being communicated; and there is ſcarcely an inſtance of a ſheep ſuffering any injury from the application. In a few days the blotches dry up, the itching ceaſes, and the animal is completely cured: it is generally, however, thought proper not to delay the operation beyond Michaelmas.

"The *hippoboſca ovina*, called in Lincolnſhire *ſheep fugg*, an animal well known to all ſhepherds, which lives among the wool, and is hurtful to the thriving of ſheep both by the pain its bite occaſions and the blood it ſucks, is deſtroyed by this application, and the wool is not at all injured. Our wool-buyers purchaſe the fleeces on which the ſtain of the ointment is viſible, rather in preference to others, from an opinion that the uſe of it

(c) By ſome unaccountable miſtake the laſt ingredient, the four pounds of hogs lard, is omitted in the receipt publiſhed in the Tranſactions of the Society; a circumſtance that might be productive of bad effects.—The leaf which contained the receipt has ſince been cancelled, and a new one printed.

Sheep. it having preſerved the animal from being vexed either with the ſcab or faggs, the wool is leſs liable to the defects of joints or knots; a fault obſerved to proceed from every ſudden ſtop in the thriving of the animal, either from want of food or from diſeaſe.

"This mode of curing was brought into that part of Lincolnſhire where my property is ſituated about 12 years ago, by Mr Stephenſon of Mareham, and is now ſo generally received, that the ſcab, which uſed to be the terror of the farmers, and which frequently deterred the more careful of them from taking the advantage of paſturing their ſheep in the fertile and extenſive commons with which that diſtrict abounds, is no longer regarded with any apprehenſion: by far the moſt of them have their flock anointed in autumn, when they return from the common, whether they ſhow any ſymptoms of ſcab or not; and having done ſo, conclude them ſafe for ſome time from either giving or receiving infection. There are people who employ themſelves in the buſineſs, and contract to anoint our large ſheep at five ſhillings a ſcore, inſuring for that price the ſucceſs of the operation; that is, agreeing, in caſe many of the ſheep break out afreſh, to repeat the operation gratis even ſome months afterwards."

26 The dunt. The *dunt* is a diſtemper cauſed by a bladder of water gathering in the head. No cure for this has yet been diſcovered.

27 Rickets. The *rickets* is a hereditary diſeaſe for which no antidote is known. The firſt ſymptom is a kind of lightheadedneſs, which makes the affected ſheep appear wilder than uſual when the ſhepherd or any perſon approaches him. He bounces up ſuddenly from his lare, and runs to a diſtance, as though he were purſued by dogs. In the ſecond ſtage the principal ſymptom is the ſheep's rubbing himſelf againſt trees, &c. with ſuch fury as to pull off his wool and tear away his fleſh. "The diſtreſſed animal has now a violent itching in his ſkin, the effect of a highly inflamed blood; but it does not appear that there is ever any cutaneous eruption or ſalutary critical diſcharge. In ſhort, from all circumſtances, the fever appears now to be at its height."—The laſt ſtage of this diſeaſe "ſeems only to be the progreſs of diſſolution, after an unfavourable criſis. The poor animal, as condemned by Nature, appears ſtupid, walks irregularly (whence probably the name *rickets*), generally lies, and eats little: theſe ſymptoms increaſe in degree till death, which follows a general conſumption, as appears upon diſſection of the carcaſe; the juices and even ſolids having ſuffered a general diſſolution.

In order to diſcover the ſeat and nature of this diſeaſe, ſheep that die of it ought to be diſſected. This is ſaid to have been done by one gentleman, Mr Beal; and he found in the brain or membranes adjoining a maggot about a quarter of an inch long, and of a browniſh colour. A few experiments might eaſily determine this fact.

28 Fly-ſtruck. The *fly-ſtruck* is cured by clipping the wool off as far as infected, and rubbing the parts dry with lime or wood-aſhes; curriers oil will heal the wounds, and prevent their being ſtruck any more; or they may be cured with care, without clipping, with oil of turpentine, which will kill all the vermin where it goes; but the former is the ſureſt way.

29 Flux. The *flux* is another diſeaſe to which ſheep are ſubject. The beſt remedy is ſaid to be, to houſe the ſheep immediately when this diſtemper appears, to keep them very warm, and feed them on dry hay, giving them frequent gliſters of warm milk and water. The cauſe of that diſtemper is either their feeding on wet lands, or on graſs that is become moſſy by the lands having been fed many years without being ploughed. When the farmer perceives his ſheep-walks to become moſſy, or to produce bad graſs, he ſhould either plough or manure with hot lime, making kilns either very near or in the ſheep walks, becauſe the hotter the lime is put on, the ſweeter the graſs comes up, and that early in the year.

30 And burſting. *Burſting*, or as it is called in ſome places the *blaſt*, attacks ſheep when driven into freſh graſs or young clover. They overeat themſelves, foam at the mouth, ſwell exceedingly, breathe very quick and ſhort, then jump up, and inſtantly fall down dead. In this caſe, the only chance of ſaving their life is by ſtabbing them in the maw with an inſtrument made for the purpoſe. The inſtrument is a hollow tube, with a pointed weapon paſſing through it. A hole is made with the pointed weapon; which is immediately withdrawn, and the hole is kept open by inſerting the tube till the wind is diſcharged.

31 Account of the noſe-worms which infeſt ſheep. Sheep are infeſted with worms in their noſe called *œſtrus oves*, and produced from the egg of a large two-winged fly. The frontal ſinuſes above the noſe in ſheep and other animals are the places where theſe worms live and attain their full growth. Theſe ſinuſes are always full of a ſoft white matter, which furniſhes theſe worms with a proper nouriſhment, and are ſufficiently large for their habitation; and when they have here acquired their deſtined growth, in which they are fit to undergo their changes for the fly-ſtate, they leave their old habitation, and, falling to the earth, bury themſelves there; and when theſe are hatched into flies, the female, when ſhe has been impregnated by the male, knows that the noſe of a ſheep or other animal is the only place for her to depoſit her eggs, in order to their coming to maturity. Mr Valliſnieri, to whom the world owes ſo many diſcoveries in the inſect claſs, is the firſt who has given any true account of the origin of theſe worms. But though their true hiſtory had been till that time unknown, the creatures themſelves were very early diſcovered, and many ages ſince were eſteemed great medicines in epilepſies.

The fly produced from this worm has all the time of its life a very lazy diſpoſition, and does not like to make any uſe either of its legs or wings. Its head and corſelet together are about as long as its body, which is compoſed of five rings, ſtreaked on the back; a pale yellow and brown are there diſpoſed in irregular ſpots; the belly is of the ſame colours, but they are there more regularly diſpoſed, for the brown here makes three lines, one in the middle, and one on each ſide, and all the intermediate ſpaces are yellow. The wings are nearly of the ſame length with the body, and are a little inclined in their poſition, ſo as to lie upon the body: they do not, however, cover it; but a naked ſpace is left between them. The ailerous or petty wings which are found under each of the wings are of a whitiſh colour, and perfectly cover the balancers, ſo that they are not to be ſeen without lifting up theſe.

The fly will live two months after it is firſt produced,

Sheep
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Sheers.

ced, but will take no nouriſhment of any kind; and poſſibly it may be of the ſame nature with the butterflies, which never take any food during the whole time of their living in that ſtate. Reaumur, Hiſt. Inſ. vol. iv. p. 552, &c.

32 Compoſition for marking ſheep,

To find a proper compoſition for marking ſheep is a matter of great importance, as great quantities of wool are every year rendered uſeleſs by the pitch and tar with which they are uſually marked. The requiſite qualities for ſuch a compoſition are, that it be cheap, that the colour be ſtrong and laſting, ſo as to bear the changes of weather, and not to injure the wool. Dr Lewis recommends for this purpoſe melted tallow, with ſo much charcoal in fine powder ſtirred into it as is ſufficient to make it of a full black colour, and of a thick conſiſtence. This mixture, being applied warm with a marking iron, on pieces of flannel, quickly fixed or hardened, bore moderate rubbing, reſiſted the ſun and rain, and yet could be waſhed out freely with ſoap, or ley, or ſtale urine. In order to render it ſtill more durable, and prevent its being rubbed off, with the tallow may be melted an eighth, ſixth, or fourth, of its weight of tar, which will readily waſh out along with it from the wool. Lewis's Com. Phil. Techn. p. 361.

SHEEP-Stealing. See THEFT.

SHEERING, in the ſea-language. When a ſhip is not ſteered ſteadily, they ſay ſhe ſheers, or goes ſheering; or when, at anchor, ſhe goes in and out by means of the current of the tide, they alſo ſay ſhe ſheers.

SHEERNESS, a fort in Kent, ſeated on the point where the river Medway falls into the Thames. It was built by King Charles II. after the inſult of the Dutch, who burnt the men of war at Chatham. The buildings belonging to it, in which the officers lodge, make a pretty little neat town; and there is alſo a yard and a dock, a chapel and a chaplain. Mr Lyons, who ſailed with the honourable Captain Phipps in his voyage towards the pole, fixed the longitude of Sheerneſs to 0. 48′. E. its latitude 51° 25′.

SHEERS, a name given to an engine uſed to hoiſt or diſplace the lower maſts of a ſhip. The ſheers employed for this purpoſe in the royal navy are compoſed of ſeveral long maſts, whoſe heels reſt upon the ſide of the hulk, and having their heads declining outward from the perpendicular, ſo as to hang over the veſſel whoſe maſts are to be fixed or diſplaced. The tackles, which extend from the head of the maſt to the ſheer-heads, are intended to pull in the latter toward the maſt-head, particularly when they are charged with the weight of a maſt after it is raiſed out of any ſhip, which is performed by ſtrong tackles depending from the ſheer-heads. The effort of theſe tackles is produced by two capſterns, fixed on the deck for this purpoſe.

In merchant ſhips this machine is compoſed of two maſts or props, erected in the ſame veſſel wherein the maſt is to be planted, or from whence it is to be removed. The lower ends of theſe props reſt on the oppoſite ſides of the deck, and their upper parts are faſtened acroſs, ſo as that a tackle which hangs from the interſection may be almoſt perpendicularly above the ſtation of the maſt to which the mechanical powers are applied. Theſe ſheers are ſecured by ſtays which extend forward and aft to the oppoſite extremities of the veſſel.

SHEERS, aboard a ſhip, an engine uſed to hoiſt or diſplace the lower maſts of a ſhip.

Sheet
||
Sheffield.

SHEET-LEAD. See PLUMBERY.

SHEET, in ſea-language, a rope faſtened to one or both the lower corners of a ſail, to extend and retain it in a particular ſtation. When a ſhip ſails with a lateral wind, the lower corner of the main and fore ſail are faſtened by a tack and a ſheet; the former being to windward, and the latter to leeward; the tack, however, is entirely diffuſed with a ſtern wind, whereas the ſail is never ſpread without the aſſiſtance of one or both of the ſheets. The ſtay-ſails and ſtudding ſails have only one tack and one ſheet each: the ſtay-ſail tacks are always faſtened forward, and the ſheet drawn aft; but the ſtudding-ſail tack draws the under clue of the ſail to the extremity of the boom, whereas the ſheet is employed to extend the inmoſt.

SHEFFIELD, a town in the weſt riding of Yorkſhire, about 162 miles from London, is a large, thriving town on the borders of Derbyſhire, with a population of 31,314 ſouls; has a fine ſtone bridge over the Don, and another over the Sheaf, and a church built in the reign of Henry I. It had a caſtle built in the reign of Henry III. in which, or elſe in the manor-houſe of the Park, Mary queen of Scots was priſoner 16 or 17 years; but after the death of Charles I. it was with ſeveral others, by order of parliament demoliſhed. In 1673 an hoſpital was erected here, and endowed with 200l. a-year. There is a charity-ſchool for 30 boys, and another for 30 girls. This town has been noted ſeveral hundred years for cutlers and ſmiths manufactures, which were encouraged and advanced by the neighbouring mines of iron, particularly for files, and knives or whittles; for the laſt of which eſpecially it has been a ſtaple for above 300 years; and it is reputed to excel Birmingham in theſe wares, as much as it is ſurpaſſed by it in locks, hinges, nails, and poliſhed ſteel. The firſt mills in England for turning grindſtones were alſo ſet up here. The houſes look black from the continual ſmoke of the forges. Here are 600 maſter cutlers, incorporated by the ſtyle of the *Cutlers of Hallamſhire* (of which this is reckoned the chief town), who employ no leſs than 40,000 perſons in the iron manufactures; and each of the maſters gives a particular ſtamp to his wares. There is a large market on Tueſday for many commodities, but eſpecially for corn, which is bought up here for the whole weſt riding, Derbyſhire, and Nottinghamſhire. It has fairs on Tueſday after Trinity-Sunday, and November 28. In the new market-place, erected by the duke of Norfolk, the ſhambles are built upon a moſt excellent plan, and ſtrongly incloſed. There are ſeveral other new good buildings, ſuch as a large and elegant octagon chapel belonging to the hoſpital or almshouſes; likewiſe a good aſſembly-room and theatre. We muſt not omit the large ſteam-engine, lately finiſhed, for the purpoſe of poliſhing and grinding the various ſorts of hardware. The pariſh being very large, as well as populous, Mary I. incorporated 12 of the chief inhabitants, and their ſucceſſors for ever, by the ſtyle of the *Twelve Capital Burgeſſes of Sheffield*, empowering them to elect and ordain three prieſts to aſſiſt the vicar, who were to be paid out of certain lands and rents which ſhe gave out of the crown; and ſince this ſettlement two more chapels have been built in two hamlets of this pa-

riſh,

Sheffield. riſh, which are ſerved by two of the aſſiſtants, while the third, in his turn, helps the vicar in his pariſh-church. James I. founded a free grammar-ſchool here, and appointed 13 ſchool burgeſſes to manage the revenue, and appoint the maſter and uſher. A new chapel was built lately by the contributions of the people of the town and of the neighbouring nobility and gentry Water is conveyed by pipes into Sheffield, whoſe inhabitants pay but a moderate rent for it. In the neighbourhood there are ſome mines of alum. The remains of the Roman fortification between this town and Rotheram, which is ſix miles lower down the river, are ſtill viſible; and here alſo is the famous trench of five miles long, by ſome called *Devil's* or *Dane's Bank*, and by others *Kemp Bank* and *Temple's Bank*. Weſt Long. 1. 29. N. Lat. 13. 20.

SHEFFIELD, *John*, duke of Buckinghamſhire, an eminent writer of the 17th and 18th century, of great perſonal bravery, and an able miniſter of ſtate, was born about 1650. He loſt his father at nine years of age; and his mother marrying Lord Oſſulſton, the care of his education was left entirely to a governor, who did not greatly improve him in his ſtudies. Finding that he was deficient in many parts of literature, he reſolved to devote a certain number of hours every day to his ſtudies; and thereby improved himſelf to the degree of learning he afterwards attained. Though poſſeſſed of a good eſtate, he did not abandon himſelf to pleaſure and indolence, but entered a volunteer in the ſecond Dutch war; and accordingly was in that famous naval engagement where the duke of York commanded as admiral: on which occaſion his lordſhip behaved ſo gallantly, that he was appointed commander of the Royal Catharine. He afterward made a campaign in the French ſervice under M. de Turenne. As Tangier was in danger of being taken by the Moors, he offered to head the forces which were ſent to defend it; and accordingly was appointed to command them. He was then earl of Mulgrave, and one of the lords of the bed-chamber to King Charles II. The Moors retired on the approach of his majeſty's forces; and the reſult of the expedition was the blowing up of Tangier. He continued in ſeveral great poſts during the ſhort reign of King James II. till that unfortunate prince was dethroned. Lord Mulgrave, though he paid his reſpects to King William before he was advanced to the throne, yet did not accept of any poſt in the government till ſome years after. In the ſixth year of William and Mary he was created marquis of Normanby in the county of Lincoln. He was one of the moſt active and zealous oppoſers of the bill which took away Sir John Fenwick's life; and exerted the utmoſt vigour in carrying through the Treaſon Bill, and the bill for Triennial Parliaments. He enjoyed ſome conſiderable poſts under King William, and enjoyed much of his favour and confidence. In 1702 he was ſworn lord privy-ſeal; and in the ſame year was appointed one of the commiſſioners to treat of an union between England and Scotland. In 1703 he was created duke of Normanby, and ſoon after duke of Buckinghamſhire. In 1711 he was made ſteward of her majeſty's houſehold, and preſident of the council. During Queen Anne's reign he was but once out of employment; and then he voluntarily reſigned, being attached to what were called the *Tory principles*. Her majeſty offered to make him lord chancellor; but he declined the office. He was inſtrumental in the change of the miniſtry in 1710. A circumſtance that reflects the higheſt honour on him is, the vigour with which he acted in favour of the unhappy Catalans, who afterward were ſo inhumanly ſacrificed. He was ſurvived by only one legitimate ſon (who died at Rome in 1735); but left ſeveral natural children. He died in 1721. He was admired by the poets of his age; by Dryden, Prior, and Garth. His Eſſay on Poetry was applauded by Addiſon, and his Rehearſal is ſtill read with pleaſure. His writings were ſplendidly printed in 1723, in two volumes 4to; and have ſince been reprinted in 1729, in two volumes 8vo. The firſt contains his poems on various ſubjects; the ſecond, his proſe works; which conſiſt of hiſtorical memoirs, ſpeeches in parliament, characters, dialogues, critical obſervations, eſſays, and letters. It may be proper to obſerve, that the edition of 1729 is caſtrated; ſome particulars relating to the revolution in that of 1723 having given offence. Sheffield & Sheik.

SHEFFIELDIA, a genus of plants belonging to the claſs of pentandria, and to the order of monogynia. The corolla is bell-ſhaped; the filaments are ten; of which every ſecond is barren. The capſule conſiſts of one cell, which has four valves. There is only one ſpecies, the *repens*, a native of New Zealand.

SHEIBON, a diſtrict in Africa, lying on the ſouth-eaſt of the kingdom of Dar-Fur, where much gold is found both in duſt and in ſmall pieces. The idolatrous natives and ſavages collect the duſt in quills of the oſtrich and vulture, and in that condition diſpoſe of it to the merchants. On diſcovering a large piece of gold, they kill a ſheep on it before it is removed. Their marriage is a ſimple agreement to cohabit. The ſlaves bought in great numbers from this quarter, are partly priſoners of war among themſelves, and partly ſeduced by treachery, and ſold. In times of ſcarcity, it is ſaid, a father has been known to ſell his children.

There are ſome Mahometans at Sheibon, who wear clothing, and live among the idolaters; but it is not ſaid whether they are Arabs or not.

SHEIK, in the oriental cuſtoms, the perſon who has the care of the moſques in Egypt; his duty is the ſame as that of the imams at Conſtantinople. There are more or fewer of theſe to every moſque, according to its ſize or revenue. One of theſe is head over the reſt, and anſwers to a pariſh-prieſt with us; and has under him, in large moſques, the readers, and people who cry out to go to prayers; but in ſmall moſques the ſheik is obliged to do all this himſelf. In ſuch it is their buſineſs to open the moſque, to cry to prayers, and to begin their ſhort devotions at the head of the congregation, who ſtand rank and file in great order, and make all their motions together. Every Friday the ſheik makes an harangue to his congregation.

SHEIK-Bellet, the name of an officer in the Oriental nations. In Egypt the ſheik-bellet is the head of a city, and is appointed by the pacha. The buſineſs of this officer is to take care that no innovations be made which may be prejudicial to the Porte, and that they ſend no orders which may hurt the liberties of the people. But all his authority depends on his credit and intereſt, not his office: for the government of Egypt is of ſuch a kind, that often the people of the leaſt power by

Sheilds || Shenan.

by their poſts have the greateſt influence: and a caia of the janizaries or Arabs, and ſometimes one of their meaneſt officers, an oda-baſha, finds means, by his parts and abilities, to govern all things.

SHEILDS. See SHIELDS.

SHEKEL, the name of a weight and coin current amoug the ancient Jews. Dr Arbuthnot makes the weight of the ſhekel equal to 9 pennyweights $2\frac{4}{7}$ grains Troy weight; and the value equal to 2s. $3\frac{3}{8}$d. Sterling. The golden ſhekel was worth 1l. 16s. 6d.

SHELDRAKE. See ANAS, ORNITHOLOGY *Index*.

SHELF, among miners, the ſame with what they otherwiſe call *faſt ground*, or *faſt country*; being that part of the internal ſtructure of the earth which they find lying even and in an orderly manner, and evidently retaining its primitive form and ſituation.

SHELL, in *Natural Hiſtory*, a hard, and, as it were, ſtony covering, with which certain animals are defended, and thence called *ſhell-fiſh*. For the claſſification and hiſtory, ſee CONCHOLOGY.

SHELLS, in *Gunnery*, are hollow iron balls to throw out of mortars or howitzers, with a fuſe-hole of about an inch diameter, to load them with powder, and to receive the fuſe. The bottom, or part oppoſite to the fuſe, is made thicker than the reſt, that the fuſe may fall uppermoſt. But in ſmall elevations this does not always happen; nor indeed is it neceſſary; for, let the ſhell fall as it will, the fuſe ſets fire to the powder within, which burſts the ſhell, and cauſes great devaſtation. The ſhells had much better be of an equal thickneſs; for then they burſt into more pieces.

Meſſage SHELLS, are nothing more than howitz-ſhells, in the inſide of which a letter or other papers are put; the fuſe hole is ſtopped up with wood or cork, and the ſhells are fired out of a royal or howitz, either into a garriſon or camp. It is ſuppoſed, that the perſon to whom the letter is ſent knows the time, and accordingly appoints a guard to look out for its arrival.

SHELL-Fiſh. Theſe animals are in general oviparous, very few inſtances having been found of ſuch as are viviparous. Among the oviparous kinds, anatomiſts have found that ſome ſpecies are of different ſexes, in the different individuals of the ſame ſpecies; but others are hermaphrodites, every one being in itſelf both male and female. In both caſes their increaſe is very numerous, and ſcarce inferior to that of plants, or of the moſt fruitful of the inſect claſs. The eggs are very ſmall, and are hung together in a ſort of cluſters by means of a glutinous humour, which is always placed about them, and is of the nature of the jelly of frog's ſpawn. By means of this, they are not only kept together in the parcel, but the whole cluſter is faſtened to the rocks, ſhells, or other ſolid ſubſtances; and thus they are preſerved from being driven on ſhore by the waves, and left where they cannot ſucceed.

SHELL-Gold. See GOLD.

SHELTIE, a ſmall but ſtrong kind of horſe, ſo called from Shetland, or Zetland, where they are produced.

SHELVES, in ſea-language, a general name given to any dangerous ſhallows, ſand-banks, or rocks, lying immediately under the ſurface of the water, ſo as to intercept any ſhip in her paſſage, and endanger her deſtruction.

SHENAN. See *Dyeing of* LEATHER.

SHENSTONE, WILLIAM, an admired Engliſh poet, the eldeſt ſon of a plain country gentleman, who farmed his own eſtate in Shropſhire, was born in November 1714. He learned to read of an old dame, whom his poem of the "School-miſtreſs" has delivered to poſterity; and ſoon received ſuch delight from books, that he was always calling for new entertainment, and expected that, when any of the family went to market, a new book ſhould be brought him, which, when it came, was in fondneſs carried to bed, and laid by him. It is ſaid, that when his requeſt had been neglected, his mother wrapped up a piece of wood of the ſame form, and pacified him for the night. As he grew older, he went for a while to the grammar-ſchool in Hales-Owen, and was placed afterwards with Mr Crumpton, an eminent ſchool-maſter at Solihul, where he diſtinguiſhed himſelf by the quickneſs of his progreſs. When he was young (June 1724), he was deprived of his father; and ſoon after (Auguſt 1726) of his grandfather; and was, with his brother, who died afterwards unmarried, left to the care of his grandmother, who managed the eſtate. From ſchool he was ſent, in 1732, to Pembroke college in Oxford, a ſociety which for half a century has been eminent for Engliſh poetry and elegant literature. Here it appears that he found delight and advantage; for he continued his name there ten years, though he took no degree. After the firſt four years he put on the civilian's gown, but without ſhowing any intention to engage in the profeſſion. About the time when he went to Oxford, the death of his grandmother devolved his affairs to the care of the reverend Mr Dolman, of Brome, in Staffordſhire, whoſe attention he always mentioned with gratitude. —At Oxford he applied to Engliſh poetry; and, in 1737, publiſhed a ſmall Miſcellany, without his name. He then for a time wandered about, to acquaint himſelf with life, and was ſometimes at London, ſometimes at Bath, or any place of public reſort; but he did not forget his poetry. He publiſhed, in 1740, his "Judgement of Hercules," addreſſed to Mr Lyttleton, whoſe intereſt he ſupported with great warmth at an election; this was two years afterwards followed by the "School-miſtreſs." Mr Dolman, to whoſe care he was indebted for his eaſe and leiſure, died in 1745, and the care of his fortune now fell upon himſelf. He tried to eſcape it a while, and lived at his houſe with his tenants, who were diſtantly related; but, finding that imperfect poſſeſſion inconvenient, he took the whole eſtate into his own hands, an event which rather improved its beauty than increaſed its produce. Now began his delight in rural pleaſures, and his paſſion of rural elegance; but in time his expences occaſioned clamours that overpowered the lamb's bleat and the linnet's ſong, and his groves were haunted by beings very different from fauns and fairies. He ſpent his eſtate in adorning it, and his death was probably haſtened by his anxieties. He was a lamp that ſpent its oil in blazing. It is ſaid, that if he had lived a little longer, he would have been aſſiſted by a penſion; ſuch bounty could not have been more properly beſtowed, but that it was ever aſked is not certain; it is too certain that it never was enjoyed.—He died at the Leaſowes, of a putrid fever, about five on Friday morning, Feb. 11. 1763; and was buried by the ſide of his brother, in the churchyard of Hales-Owen.

Shenſtone.

Shenſtone || Sheridan.

In his private opinions, our author adhered to no particular ſect, and hated all religious diſputes. Tenderneſs, in every ſenſe of the word, was his peculiar characteriſtic; and his friends, domeſtics, and poor neighbours, daily experienced the effects of his benevolence. This virtue he carried to an exceſs that ſeemed to border upon weakneſs; yet if any of his friends treated him ungenerouſly, he was not eaſily reconciled. On ſuch occaſions, however, he uſed to ſay, "I never will be a revengeful enemy; but I cannot, it is not in my nature, to be half a friend." He was no economiſt; for the generoſity of his temper prevented his paying a proper regard to the uſe of money: he exceeded therefore the bounds of his paternal fortune. But, if we conſider the perfect paradiſe into which he had converted his eſtate, the hoſpitality with which he lived, his charities to the indigent, and all out of an eſtate that did not exceed 300l. a-year, one ſhould rather wonder that he left any thing behind him, than blame his want of economy: he yet left more than ſufficient to pay all his debts, and by his will appropriated his whole eſtate to that purpoſe. Though he had a high opinion of many of the fair ſex, he forbore to marry. A paſſion he entertained in his youth was with difficulty ſurmounted. The lady was the ſubject of that admirable paſtoral, in four parts, which has been ſo univerſally read and admired, and which, one would have thought, muſt have ſoftened the proudeſt and moſt obdurate heart. His works have been publiſhed by Mr Dodſley, in 3 vols 8vo. The firſt volume contains his poetical works, which are particularly diſtinguiſhed by an amiable elegance and beautiful ſimplicity; the ſecond volume contains his proſe works; the third his letters, &c. *Biog. Dict.*

SHEPPEY, an iſland at the mouth of the river Medway, about 20 miles in circumference. It is ſeparated from the main land by a narrow channel; and has a fertile ſoil, which feeds great flocks of ſheep. The borough-town of Queenborough is ſeated thereon; beſides which it has ſeveral villages.

SHERARDIA, a genus of plants belonging to the tetrandria claſs, and in the natural method ranking under the 47th order, *Stellatæ*. See BOTANY *Index*.

SHERBET, or SHERBIT, a compound drink, firſt brought into England from Turkey and Perſia, conſiſting of water, lemon-juice, and ſugar, in which are diſſolved perfumed cakes made of excellent Damaſcus fruit, containing an infuſion of ſome drops of roſe water. Another kind of it is made of violets, honey, juice of raiſins, &c.

SHERIDAN, THOMAS, D. D. the intimate friend of Dean Swift, is ſaid by Shield, in Cibber's "Lives of the Poets," to have been born about 1684, in the county of Cavan, where, according to the ſame authority, his parents lived in no very elevated ſtate. They are deſcribed as being unable to afford their ſon the advantages of a liberal education; but he, being obſerved to give early indications of genius, attracted the notice of a friend to his family, who ſent him to the college of Dublin, and contributed towards his ſupport while he remained there. He afterwards entered into orders, and ſet up a ſchool in Dublin, which long maintained a very high degree of reputation, as well for the attention beſtowed on the morals of the ſcholars as for their proficiency in literature. So great was the eſtimation in which this ſeminary was held, that it is aſſerted to have produced in ſome years the ſum of 1000l. It does not appear that he had any conſiderable preferment; but his intimacy with Swift, in 1725, procured for him a living in the ſouth of Ireland worth about 150l. a-year, which he went to take poſſeſſion of, and, by an act of inadvertence, deſtroyed all his future expectations of riſing in the church; for being at Corke on the 1ſt of Auguſt, the anniverſary of King George's birth-day, he preached a ſermon, which had for its text, "Sufficient for the day is the evil thereof." On this being known, he was ſtruck out of the liſt of chaplains to the lord lieutenant, and forbidden the caſtle. Sheridan.

This living Dr Sheridan afterwards changed for that of Dunboyne, which, by the knavery of the farmers, and power of the gentlemen in the neighbourhood, fell ſo low as 80l. per annum. He gave it up for the free ſchool of Cavan, where he might have lived well in ſo cheap a country on 80l. a-year ſalary, beſides his ſcholars; but the air being, as he ſaid, too moiſt and unwholeſome, and being diſguſted with ſome perſons who lived there, he ſold the ſchool for about 400l.; and having ſoon ſpent the money, he fell into bad health, and died Sept. 10. 1738, in his 55th year.

Lord Corke has given the following character of him: "Dr Sheridan was a ſchool-maſter, and in many inſtances perfectly well adapted for that ſtation. He was deeply verſed in the Greek and Roman languages, and in their cuſtoms and antiquities. He had that kind of good nature which abſence of mind, indolence of body, and careleſſneſs of fortune, produce; and although not over ſtrict in his own conduct, yet he took care of the morality of his ſcholars, whom he ſent to the univerſity remarkably well founded in all kinds of claſſical learning, and not ill inſtructed in the ſocial duties of life. He was ſlovenly, indigent, and cheerful. He knew books much better than men; and he knew the value of money leaſt of all. In this ſituation, and with this diſpoſition, Swift faſtened upon him as upon a prey with which he intended to regale himſelf whenever his appetite ſhould prompt him." His Lordſhip then mentions the event of the unlucky ſermon, and adds: "This ill-ſtarred, good-natured, improvident man, returned to Dublin, unhinged from all favour at court, and even baniſhed from the caſtle. But ſtill he remained a punſter, a quibbler, a fiddler, and a wit. Not a day paſſed without a rebus, an anagram, or a madrigal. His pen and his fiddleſtick were in continual motion; and yet to little or no purpoſe, if we may give credit to the following verſes, which ſhall ſerve as the concluſion of his poetical character:

"With muſic and poetry equally bleſs'd,
"A bard thus Apollo moſt humbly addreſs'd;
"Great author of poetry, muſic, and light,
"Inſtructed by thee, I both fiddle and write;
"Yet unheeded I ſcrape, or I ſcribble all day,
"My tunes are neglected, my verſe flung away.
"Thy ſubſtitute here, Vice-Apollo diſdains
"To vouch for my numbers, or liſt to my ſtrains.
"Thy manual ſign he refuſes to put
"To the airs I produce from the pen or the gut:
"Be thou then propitious, great Phœbus, and grant
"Relief, or reward, to my merit or want.

Sheridan, Sheriff.

" Tho' the Dean and Delany tranſcendently ſhine,
" O! brighten one ſolo or ſonnet of mine:
" Make one work immortal, 'tis all I requeſt.
" Apollo look'd pleas'd, and reſolving to jeſt,
" Replied—Honeſt friend, I've conſider'd your caſe,
" Nor diſlike your unmeaning and innocent face.
" Your petition I grant, the boon is not great,
" Your works ſhall continue, and here's the receipt:
" On rondeaus hereafter your fiddle-ſtrings ſpend,
" Write verſes in circles, they never ſhall end."

" One of the volumes of Swift's miſcellanies conſiſts almoſt entirely of letters between him and the Dean. He publiſhed a proſe tranſlation of Perſius; to which he added the beſt notes of former editors, together with many judicious ones of his own. This work was printed at London, 1739, in 12mo. *Biog. Dict.*

SHERIDAN, *Mrs Frances*, wife to Thomas Sheridan, M. A. was born in Ireland about the year 1724, but deſcended from a good Engliſh family which had removed thither. Her maiden name was Chamberlaine, and ſhe was grand-daughter of Sir Oliver Chamberlaine. The firſt literary performance by which ſhe diſtinguiſhed herſelf was a little pamphlet at the time of a violent party-diſpute relative to the theatre, in which Mr Sheridan had newly embarked his fortune. So well-timed a work exciting the attention of Mr Sheridan, he by an accident diſcovered his fair patroneſs, to whom he was ſoon afterwards married. She was a perſon of the moſt amiable character in every relation of life, with the moſt engaging manners. After lingering ſome years in a very weak ſtate of health, ſhe died at Blois, in the ſouth of France, in the year 1767. Her " Sydney Biddulph" may be ranked with the firſt productions of that claſs in ours or in any other language. She alſo wrote a little romance in one volume called *Nourjahad*, in which there is a great deal of imagination productive of an admirable moral. And ſhe was the authoreſs of two comedies, " The Diſcovery" and " The Dupe."

Blackſt. Comment. vol. i. p. 339.

SHERIFF, an officer, in each county in England, nominated by the king, inveſted with a judicial and miniſterial power, and who takes place of every nobleman in the county during the time of his office.

The ſheriff is an officer of very great antiquity in this kingdom, his name being derived from two Saxon words, ſignifying the *reeve*, *bailiff*, or *officer* of the ſhire. He is called in Latin *vice-comes*, as being the deputy of the earl or *comes*, to whom the cuſtody of the ſhire is ſaid to have been committed at the firſt diviſion of this kingdom into counties. But the earls, in proceſs of time, by reaſon of their high employments and attendance on the king's perſon, not being able to tranſact the buſineſs of the county, were delivered of that burden; reſerving to themſelves the honour, but the labour was laid on the ſheriff. So that now the ſheriff does all the king's buſineſs in the county; and though he be ſtill called *vice-comes*, yet he is entirely independent of, and not ſubject to, the earl; the king, by his letters patent, committing *cuſtodiam comitatus* to the ſheriff, and to him alone.

Sheriffs were formerly choſen by the inhabitants of the ſeveral counties. In confirmation of which it was ordained, by ſtatute 28 Edw. I. c. 8. that the people ſhould have an election of ſheriffs in every ſhire where the ſhrievalty is not of inheritance. For anciently in ſome counties the ſheriffs were hereditary; as we apprehend they were in Scotland till the ſtatute 20 Geo. II. c. 43; and ſtill continue in the county of Weſtmoreland to this day; the city of London having alſo the inheritance of the ſhrievalty of Middleſex veſted in their body by charter. The reaſon of theſe popular elections is aſſigned in the ſame ſtatute, c. 13. " that the commons might chooſe ſuch as would not be a burden to them." And herein appears plainly a ſtrong trace of the democratical part of our conſtitution; in which form of government it is an indiſpenſable requiſite, that the people ſhould chooſe their own magiſtrates. This election was in all probability not abſolutely veſted in the commons, but required the royal approbation. For in the Gothic conſtitution, the judges of their county courts (which office is executed by the ſheriff) were elected by the people, but confirmed by the king: and the form of their election was thus managed; the people, or *incolæ territorii*, choſe twelve electors, and they nominated three perſons, *ex quibus rex unum confirmabat*. But, with us in England, theſe popular elections, growing tumultuous, were put an end to by the ſtatute 9. Edw. II. ſt. 2. which enacted, that the ſheriffs ſhould from thenceforth be aſſigned by the chancellor, treaſurer, and the judges; as being perſons in whom the ſame truſt might with confidence be repoſed. By ſtatutes 14 Edw. III. c. 7. 23 Hen. VI. c. 8. and 21 Hen. VIII. c. 20. the chancellor, treaſurer, preſident of the king's council, chief juſtices, and chief baron, are to make this election; and that on the morrow of All Souls, in the exchequer. And the king's letters patent, appointing the new ſheriffs, uſed commonly to bear date the ſixth day of November. The ſtatute of Cambridge, 12 Ric. II. c. 2. ordains, that the chancellor, treaſurer, keeper of the privy ſeal, ſteward of the king's houſe, the king's chamberlain, clerk of the rolls, the juſtices of the one bench and the other, barons of the exchequer, and all other that ſhall be called to ordain, name, or make juſtices of the peace, ſheriffs, and other officers of the king, ſhall be ſworn to act indifferently, and to name no man that ſueth to be put in office, but ſuch only as they ſhall judge to be the beſt and moſt ſufficient. And the cuſtom now is (and has been at leaſt ever ſince the time of Forteſcue, who was chief juſtice and chancellor to Henry the ſixth), that all the judges, together with the other great officers, meet in the exchequer chamber on the morrow of All Souls yearly, (which day is now altered to the morrow of St Martin, by the laſt act for abbreviating Michaelmas term), and then and there propoſe three perſons to the king, who afterwards appoints one of them to be ſheriff. This cuſtom of the twelve judges propoſing three perſons ſeems borrowed from the Gothic conſtitution before-mentioned: with this difference, that among the Goths the 12 nominors were firſt elected by the people themſelves. And this uſage of ours, at its firſt introduction, there is reaſon to believe, was founded upon ſome ſtatute, though not now to be found among our printed laws; firſt, becauſe it is materially different from the direction of all the ſtatutes before-mentioned; which it is hard to conceive that the judges would have countenanced by their concurrence, or that Forteſcue would have inſerted in his book, unleſs by the authority of ſome ſtatute; and alſo, becauſe a ſtatute is expreſsly referred to in the record, which Sir Edward Coke tells

Sheriff.

Sheriff. tells us he tranſcribed from the council book of 3d March, 34 Hen. VI. and which is in ſubſtance as follows. The king had of his own authority appointed a man ſheriff of Lincolnſhire, which office he refuſed to take upon him; whereupon the opinions of the judges were taken, what ſhould be done in this behalf. And the two chief juſtices, Sir John Forteſcue and Sir John Priſot, delivered the unanimous opinion of them all; "that the king did an error when he made a perſon ſheriff that was not choſen and preſented to him according to the ſtatute; that the perſon refuſing was liable to no fine for diſobedience, as if he had been one of the three perſons choſen according to the tenor of the ſtatute; that they would adviſe the king to have recourſe to the three perſons that were choſen according to the ſtatute, or that ſome other thrifty man be intreated to occupy the office for this year; and that, the next year, to eſchew ſuch inconveniences, the order of the ſtatute in this behalf made be obſerved." But, notwithſtanding this unanimous reſolution of all the judges of England, thus entered in the council-book, and the ſtatute 34 and 35 Hen. VIII. c. 26. § 61. which expreſsly recognizes this to be the law of the land, ſome of our writers have affirmed, that the king, by his prerogative, may name whom he pleaſes to be ſheriff, whether choſen by the judges or not. This is grounded on a very particular caſe in the fifth year of Queen Elizabeth, when, by reaſon of the plague, there was no Michaelmas term kept at Weſtminſter; ſo that the judges could not meet there *in craſtino animarum* to nominate the ſheriffs: whereupon the queen named them herſelf, without ſuch previous aſſembly, appointing for the moſt part one of two remaining in the laſt year's liſt. And this caſe, thus circumſtanced, is the only authority in our books for the making theſe extraordinary ſheriffs. It is true, the reporter adds, that it was held that the queen by her prerogative might make a ſheriff without the election of the judges, *non obſtante aliquo ſtatuto in contrarium;* but the doctrine of *non obſtante*, which ſets the prerogative above the laws, was effectually demoliſhed by the bill of rights at the revolution, and abdicated Weſtminſter-hall when King James abdicated the kingdom. However, it muſt be acknowledged, that the practice of occaſionally naming what are called *pocket-ſheriffs*, by the ſole authority of the crown, hath uniformly continued to the reign of his preſent majeſty; in which, it is believed, few (if any) inſtances have occurred.

Sheriffs, by virtue of ſeveral old ſtatutes, are to continue in their office no longer than one year; and yet it hath been ſaid that a ſheriff may be appointed *durante bene placito*, or during the king's pleaſure; and ſo is the form of the royal writ. Therefore, till a new ſheriff be named, his office cannot be determined, unleſs by his own death, or the demiſe of the king; in which laſt caſe it was uſual for the ſucceſſor to ſend a new writ to the old ſheriff; but now, by ſtatute 1 Anne ſt. 1. c. 8. all officers appointed by the preceding king may hold their offices for ſix months after the king's demiſe, unleſs ſooner diſplaced by the ſucceſſor. We may farther obſerve, that by ſtatute 1 Ric. II. c. 11. no man that has ſerved the office of ſheriff for one year can be compelled to ſerve the ſame again within three years after.

We ſhall find it is of the utmoſt importance to have the ſheriff appointed according to law, when we conſider his power and duty. Theſe are either as a judge, as the keeper of the king's peace, as a miniſterial officer of the ſuperior courts of juſtice, or as the king's bailiff. Sheriff.

In his judicial capacity he is to hear and determine all cauſes of 40 ſhillings value and under, in his county-court: and he has alſo a judicial power in divers other civil caſes. He is likewiſe to decide the elections of knights of the ſhire, (ſubject to the controul of the Houſe of Commons), of coroners, and of venderors; to judge of the qualification of voters, and to return ſuch as he ſhall determine to be duly elected.

As the keepers of the king's peace, both by common law and ſpecial commiſſion, he is the firſt man in the county, and ſuperior in rank to any nobleman therein, during his office. He may apprehend, and commit to priſon, all perſons who break the peace, or attempt to break it; and may bind any one in a recognizance to keep the king's peace. He may, and is bound, *ex officio*, to purſue and take all traitors, murderers, felons, and other miſdoers, and commit them to gaol for ſafe cuſtody. He is alſo to defend his county againſt any of the king's enemies when they come into the land; and for this purpoſe, as well as for keeping the peace and purſuing felons, he may command all the people of his county to attend him; which is called the *poſſe comitatus*, or power of the county; which ſummons, every perſon above 15 years old, and under the degree of a peer, is bound to attend upon warning, under pain of fine and impriſonment. But though the ſheriff is thus the principal conſervator of the peace in his county, yet, by the expreſs directions of the great charter, he, together with the conſtable, coroner, and certain other officers of the king, are forbidden to hold any pleas of the crown, or, in other words, to try any criminal offence. For it would be highly unbecoming, that the executioners of juſtice ſhould be alſo the judges; ſhould impoſe, as well as levy, fines and amercements; ſhould one day condemn a man to death, and perſonally execute him the next. Neither may he act as an ordinary juſtice of the peace during the time of his office; for this would be equally inconſiſtent, he being in many reſpects the ſervant of the juſtices.

In his miniſterial capacity, the ſheriff is bound to execute all proceſs iſſuing from the king's courts of juſtice. In the commencement of civil cauſes, he is to ſerve the writ, to arreſt, and to take bail; when the cauſe comes to trial, he muſt ſummon and return the jury; when it is determined, he muſt ſee the judgment of the court carried into execution. In criminal matters, he alſo arreſts and impriſons, he returns the jury, he has the cuſtody of the delinquent, and he executes the ſentence of the court, though it extend to death itſelf.

As the king's bailiff, it is his buſineſs to preſerve the rights of the king within his bailiwick; for ſo his county is frequently called in the writs: a word introduced by the princes of the Norman line; in imitation of the French, whoſe territory is divided into bailiwicks, as that of England into counties. He muſt ſeize to the king's uſe all lands devolved to the crown by attainder or eſcheat; muſt levy all fines and forfeitures; muſt ſeize and keep all waifs, wrecks, eſtrays, and the like, unleſs

Sheriff, Sherlock.

they be granted to ſome ſubject; and muſt alſo collect the king's rents within his bailiwick, if commanded by proceſs from the exchequer.

To execute theſe various offices, the ſheriff has under him many inferior officers; an under-ſheriff, bailiffs, and gaolers, who muſt neither buy, ſell, nor farm their offices, on forfeiture of 500l.

The under-ſheriff uſually performs all the duties of the office; a very few only excepted, where the perſonal preſence of the high ſheriff is neceſſary. But no under ſheriff ſhall abide in his office above one year; and if he does, by ſtatute 23 Hen. VI. c. 8. he forfeits 200l. a very large penalty in thoſe early days. And no under-ſheriff or ſheriff's officer ſhall practiſe as an attorney during the time he continues in ſuch office: for this would be a great inlet to partiality and oppreſſion. But theſe ſalutary regulations are ſhamefully evaded, by practiſing in the names of other attorneys, and putting in ſham deputies by way of nominal under-ſheriffs: by reaſon of which, ſays Dalton, the under-ſheriffs and bailiffs do grow ſo cunning in their ſeveral places, that they are able to deceive, and it may well be feared that many of them do deceive, both the king, the high ſheriff, and the county.

SHERIFF, in Scotland. See LAW, Part iii. ſect. 3.

SHERLOCK, WILLIAM, a learned Engliſh divine in the 17th century, was born in 1641, and educated at Eton ſchool, where he diſtinguiſhed himſelf by the vigour of his genius and his application to ſtudy. Thence he was removed to Cambridge, where he took his degrees. In 1669 he became rector of the pariſh of St George, Botolph-lane, in London; and in 1681 was collated to the prebend of Pancras, in the cathedral of St Paul's. He was likewiſe choſen maſter of the Temple, and had the rectory of Therfield in Hertfordſhire. After the Revolution he was ſuſpended from his preferment, for refuſing the oaths to King William and Queen Mary; but at laſt he took them, and publicly juſtified what he had done. In 1691 he was inſtalled dean of St Paul's. His Vindication of the Doctrine of the Trinity engaged him in a warm controverſy with Dr South and others. Biſhop Burnet tells us, he was "a clear, a polite, and a ſtrong writer; but apt to aſſume too much to himſelf, and to treat his adverſaries with contempt." He died in 1707. His works are very numerous; among theſe are, 1. A Diſcourſe concerning the Knowledge of Jeſus Chriſt, againſt Dr Owen. 2. Several pieces againſt the Papiſts, the Socinians, and Diſſenters. 3. A practical Treatiſe on Death, which is much admired. 4. A practical Diſcourſe on Providence. 5. A practical Diſcourſe on the Future Judgment; and many other works.

SHERLOCK, *Dr Thomas*, biſhop of London, was the ſon of the preceding Dr William Sherlock, and was born in 1678. He was educated in Catharine hall, Cambridge, where he took his degrees, and of which he became maſter: he was made maſter of the Temple very young, on the reſignation of his father; and it is remarkable, that this maſterſhip was held by father and ſon ſucceſſively for more than 70 years. He was at the head of the oppoſition againſt Dr Hoadley biſhop of Bangor; during which conteſt he publiſhed a great number of pieces. He attacked the famous Collins's "Grounds and Reaſons of the Chriſtian Religion," in a courſe of ſix ſermons, preached at the Temple church, which he intitled "The Uſe and Intent of Prophecy in the ſeveral Ages of the World." In 1728, Dr Sherlock was promoted to the biſhopric of Bangor; and was tranſlated to Saliſbury in 1734. In 1747 he refuſed the archbiſhopric of Canterbury, on account of his ill ſtate of health; but recovering in a good degree, accepted the ſee of London the following year. On occaſion of the earthquakes in 1750, he publiſhed an excellent Paſtoral Letter to the clergy and inhabitants of London and Weſtminſter: of which it is ſaid there were printed in 4to, 5000; in 8vo, 20,000; and in 12mo, about 30,000; beſide pirated editions, of which not leſs than 50,000 were ſuppoſed to have been ſold. Under the weak ſtate of body in which he lay for ſeveral years, he reviſed and publiſhed 4 vols of Sermons in 8vo, which are particularly admired for their ingenuity and elegance. He died in 1762, and by report worth 150,000l. "His learning," ſays Dr Nicholls, "was very extenſive: God had given him a great and an underſtanding mind, a quick comprehenſion, and a ſolid judgment. Theſe advantages of nature he improved by much induſtry and application. His ſkill in the civil and canon law was very conſiderable; to which he had added ſuch a knowledge of the common law of England as few clergymen attain to. This it was that gave him that influence in all cauſes where the church was concerned; as knowing preciſely what it had to claim from its conſtitutions and canons, and what from the common law of the land." Dr Nicholls then mentions his conſtant and exemplary piety, his warm and fervent zeal in preaching the duties and maintaining the doctrines of Chriſtianity, and his large and diffuſive munificence and charity; particularly by his having given large ſums of money to the corporation of clergymen's ſons, to ſeveral of the hoſpitals, and to the ſociety for propagating the goſpel in foreign parts: alſo his bequeathing to Catharine-hall in Cambridge, the place of his education, his valuable library of books, and his donations for the founding a librarian's place and a ſcholarſhip, to the amount of ſeveral thouſand pounds.

Sherlock, Sherriffe.

SHERRIFFE of Mecca, the title of the deſcendants of Mahomet by Haſſan Ibn Ali. Theſe are divided into ſeveral branches, of which the family of Ali Bunemi, conſiſting at leaſt of three hundred individuals, enjoy the ſole right to the throne of Mecca. The Ali Bunemi are, again, ſubdivided into two ſubordinate branches, Darii Sajid, and Darii Barkad; of whom ſometimes the one, ſometimes the other, have given ſovereigns to Mecca and Medina, when theſe were ſeparate ſtates.

Not only is the Turkiſh ſultan indifferent about the order of ſucceſſion in this family, but he ſeems even to foment the diſſenſions which ariſe among them, and favours the ſtrongeſt, merely that he may weaken them all. As the order of ſucceſſion is not determinately fixed, and the ſherriffes may all aſpire alike to the ſovereign power, this uncertainty of right, aided by the intrigues of the Turkiſh officers, occaſions frequent revolutions. The grand ſherriffe is ſeldom able to maintain himſelf on the throne; and it ſtill ſeldomer happens that his reign is not diſturbed by the revolt of his neareſt relations. There have been inſtances of a nephew ſucceeding his uncle, an uncle ſucceeding his nephew; and

Sherriffe. and ſometimes of a perſon, from a remote branch, coming in the room of the reigning prince of the ancient houſe.

When Niebuhr was in Arabia, in 1763, the reigning Sherriffe Meſad had ſitten fourteen years on the throne, and, during all that period, had been continually at war with the neighbouring Arabs, and with his own neareſt relations ſometimes. A few years before, the pacha of Syria had depoſed him, and raiſed his younger brother to the ſovereign dignity in his ſtead. But after the departu e of the caravan, Jafar, the new ſherriffe, not being able to maintain himſelf on the throne, was obliged to reſign the ſovereignty again to Meſad. Achmet, the ſecond brother of the ſherriffe, who was much beloved by the Arabs, threatened to attack Mecca while Niebuhr was at Jidda. Our traveller was ſoon after informed of the termination of the quarrel, and of Achmet's return to Mecca, where he continued to live peaceably in a private character.

Theſe examples ſhow that the Muſſulmans obſerve not the law which forbids them to bear arms againſt their holy places. An Egyptian bey even preſumed, a few years ſince, to plant ſome ſmall cannons within the compaſs of the Kaaba, upon a ſmall tower, from which he fired over that ſacred manſion, upon the palace of Sherriffe Meſad, with whom he was at variance.

The dominions of the ſherriffe, comprehend the cities of Mecca, Medina, Jambo, Taaif, Sadie, Ghunfude, Hali, and thirteen others leſs conſiderable, all ſituated in Hedjas. Near Taaif is the lofty mountain of Gazvan, which according to Arabian authors, is covered with ſnow in the midſt of ſummer. As theſe dominions are neither opulent nor extenſive, the revenue of their ſovereign cannot be conſiderable.

He finds a rich reſource, however, in the impoſts levied on pilgrims, and in the gratuities offered him by Muſſulman monarchs. Every pilgrim pays a tax of from ten to an hundred crowns, in proportion to his ability. The Great Mogul remits annually ſixty thouſand roupees to the ſherriffe, by an aſſignment upon the government of Surat. Indeed, ſince the Engliſh made themſelves maſters of this city, and the territory belonging to it, the nabob of Surat has no longer been able to pay the ſum. The ſherriffe once demanded it of the Engliſh, as the poſſeſſors of Surat; and, till they ſhould ſatisfy him, forbade their captains to leave the port of Jidda. But the Engliſh diſregarding this prohibition, the ſherriffe complained to the Ottoman Porte, and they communicated his complaints to the Engliſh ambaſſador. He at the ſame time opened a negociation with the nominal nabob, who reſides in Surat. But all theſe ſteps proved fruitleſs: and the ſovereign of Mecca ſeems not likely to be ever more benefited by the contribution from India.

The power of the ſherriffe extends not to ſpiritual matters; theſe are entirely managed by the heads of the clergy, of different ſects, who are reſident at Mecca. Rigid Muſſulmans, ſuch as the Turks, are not very favourable in their ſentiments of the ſherriffes, but ſuſpect their orthodoxy, and look upon them as ſecretly attached to the tolerant ſect of the Zeidi. Sherriffe of Shetland.

SHETLAND, the name of certain iſlands belonging to Scotland, and lying to the northward of Orkney. There are many convincing proofs that theſe iſlands were very early inhabited by the Picts, or rather by thoſe nations who were the original poſſeſſors of the Orkneys; and at the time of the total deſtruction of theſe nations, if any credit be due to tradition, their woods were entirely ruined (A). It is highly probable that the people in Shetland, as well as in the Orkneys, flouriſhed under their own princes dependent upon the crown of Norway; yet this ſeems to have been rather through what they acquired by fiſhing and commerce, than by the cultivation of their lands. It may alſo be reaſonably preſumed, that they grew thinner of inhabitants after they were annexed to the crown of Scotland; and it is likely that they revived again, chiefly by the very great and extenſive improvements which the Dutch made in the herring fiſhery upon their coaſts, and the trade that the crews of their buſſes, then very numerous, carried on with the inhabitants, neceſſarily reſulting from their want of proviſions and other conveniences.

There are many reaſons which may be aſſigned why theſe iſlands, though part of our dominions, have not hitherto been better known to us. They were commonly placed two degrees too far to the north in all the old maps, in order to make them agree with Ptolemy's deſcription of Thule, which he aſſerted to be in the latitude of 63 degrees; which we find urged by Camden as a reaſon why Thule muſt be one of the Shetland iſles, to which Speed alſo agrees, though from their being thus wrong placed he could not find room for them in his maps. Another, and that no light cauſe, was the many falſe, fabulous, and impertinent relations publiſhed concerning them (B), as if they were countries inhoſpitable and uninhabitable; and laſtly, the indolence, or rather indifference, of the natives, who, contenting themſelves with thoſe neceſſaries and conveniences procured by their intercourſe with other nations, and conceiving themſelves neglected by the mother country, have ſeldom troubled her with their applications.

There are few countries that have gone by more names than theſe iſlands; they were called in Iſlandic, *Hialtlandia*, from *hialt*, the "hilt of a ſword;" this might be poſſibly corrupted into *Hetland*, *Hitland*, or *Hethland*; though ſome tell us this ſignifies a "high land." They have been likewiſe, and are ſtill in ſome maps, called *Zetland* and *Zealand*, in reference, as has been ſuppoſed, to their ſituation. By the Danes, and by

(A) The tradition is, that this was done by the Scots when they deſtroyed the Picts; but is more probably referred to the Norwegians rooting out the original poſſeſſors of Shetland.

(B) They repreſented the climate as intenſely cold; the ſoil as compoſed of crags and quagmire, ſo barren as to be incapable of bearing corn; to ſupply which, the people, after drying fiſh-bones, powdered them, then kneaded and baked them for bread. The larger fiſh-bones were ſaid to be all the fuel they had. Yet, in ſo dreary a country, and in ſuch miſerable circumſtances, they were acknowledged to be very long-lived, cheerful, and contented.

Shetland. by the natives, they are ſtyled *Yealtaland:* and notwithſtanding the oddneſs of the orthography, this differs very little, if at all, from their manner of pronouncing Zetland, out of which pronunciation grew the modern names of *Shetland* and *Shotland*.

The iſlands of *Shetland*, as we commonly call them, are well ſituated for trade. The neareſt continent to them is Norway; the port of Bergen lying 44 leagues eaſt, whereas they lie 46 leagues north-north-eaſt from Buchanneſs; eaſt-north-eaſt from Sanda, one of the Orkneys, about 16 or 18 leagues; ſix or ſeven leagues north-eaſt from Fair Iſle; 58 leagues eaſt from the Ferroe iſles; and at nearly the ſame diſtance north-eaſt from Lewis. The ſouthern promontory of the Mainland, called *Sumburgh Head*, lies in 59 degrees and 59 minutes of north latitude; and the northern extremity of Unſt, the moſt remote of them all, in the latitude of 61 degrees 15 minutes. The meridian of London paſſes through this laſt iſland, which lies about 2 degrees 30 minutes weſt from Paris, and about 5 degrees 15 minutes eaſt from the meridian of Cape Lizard. According to Gifford's Hiſtorical Deſcription of Zetland, the inhabited iſlands are 33, of which the principal is ſtyled *Mainland*, and extends in length from north to ſouth about 60 miles, and is in ſome places 20 broad, though in others not more than two.

It is impoſſible to ſpeak with preciſion; but, according to the beſt computation which we have been able to form, the Shetland iſles contain near three times as much land as the Orkneys: and they are conſidered as not inferior to the provinces of Utrecht, Zealand, and all the reſt of the Dutch iſlands taken together; but of climate and ſoil they have not much to boaſt. The longeſt day in the iſland of Unſt is 19 hours 15 minutes, and of conſequence the ſhorteſt day 4 hours and 45 minutes. The ſpring is very late, the ſummer very ſhort; the autumn alſo is of no long duration, dark, foggy, and rainy; the winter ſets in about November, and laſts till April, and ſometimes till May. They have frequently in that ſeaſon ſtorms of thunder, much rain, but little froſt or ſnow. High winds are indeed very frequent and very troubleſome, yet they ſeldom produce any terrible effects. The aurora borealis is as common here as in any of the northern countries. In the winter ſeaſon the ſea ſwells and rages in ſuch a manner, that for five or ſix months their ports are inacceſſible, and of courſe the people during that ſpace have no correſpondence with the reſt of the world.

The ſoil in the interior part of the Mainland, for the moſt part, is mountainous, mooriſh, and boggy, yet not to ſuch a degree as to render the country utterly impaſſable; for many of the roads here, and in ſome of the northern iſles, are as good as any other natural roads, and the people travel them frequently on all occaſions. Near the coaſt there are ſometimes for miles together flat pleaſant ſpots, very fertile both in paſture and corn. The mountains produce large crops of very nutritive graſs in the ſummer; and they cut conſiderable quantities of hay, with which they feed their cattle in the winter. They might with a little attention bring more of their country into cultivation: but the people are ſo much addicted to their fiſhery, and feel ſo little neceſſity of having recourſe to this method for ſubſiſtence, that they are content, how ſtrange ſoever that may ſeem to us, to let four parts in five of their land remain in a ſtate of nature. Shetland.

They want not conſiderable quantities of marl in different iſlands, though they uſe but little; hitherto there has been no chalk found; limeſtone and freeſtone there are in the ſouthern parts of the Mainland in great quantities, and alſo in the neighbouring iſlands, particularly Fetlar; and conſiderable quantities of ſlate, very good in its kind. No mines have been hitherto wrought to any great extent; but there are in many places appearances of metallic ores, as thoſe of copper and iron; and it is ſaid, pieces of ſilver ore have been found. In ſome of the ſmaller iſles there are ſtrong appearances of iron; but, through the want of proper experiments being made, there is, in this reſpect at leaſt, hitherto nothing certain. Their meadows are incloſed with dikes, and produce very good graſs. The little corn they grow is chiefly barley, with ſome oats; though even in the northern extremity of Unſt the little land which they have is remarkable for its fertility. The hills abound with medicinal herbs; and their kitchen-gardens thrive as well, and produce as good greens and roots, as any in Britain. Of late years, and ſince this has been attended to, ſome gentlemen have had even greater ſucceſs than they expected in the cultivating of tulips, roſes, and many other flowers. They have no trees, and hardly any ſhrubs except juniper, yet they have a tradition that their country was formerly overgrown with woods; and it ſeems to be a confirmation of this, that the roots of timber-trees have been, and are ſtill, dug up at a great depth; and that in ſome, and thoſe too inacceſſible, places, the mountain-aſh is ſtill found growing wild. That this defect, viz. the want of wood at preſent, does not ariſe entirely from the ſoil or climate, appears from ſeveral late experiments; ſome gentlemen having raiſed aſh, maple, horſe-cheſnuts, &c. in their gardens. Though the inhabitants are without either wood or coals, they are very well ſupplied with fuel, having great plenty of heath and peat. The black cattle in this country are in general of a larger ſort than in Orkney, which is owing to their having more extenſive paſtures; a clear proof that ſtill farther improvements might be made in reſpect to ſize. Their horſes are ſmall, but ſtrong, ſtout, and well-ſhaped, live very hardy, and to a great age. They have likewiſe a breed of ſmall ſwine, the fleſh of which, when fat, is eſteemed very delicious. They have no goats, hares, or foxes; and in general no wild or venomous creatures of any kind except rats in ſome few iſlands. They have no moorfowl, which is the more remarkable, as there are everywhere immenſe quantities of heath; but there are many ſorts of wild and water-fowl, particularly the dunter-gooſe, clack-gooſe, ſolan-gooſe, ſwans, ducks, teal, whaps, foiſts, lyres, kittiwakes, maws, plovers, cormorants, &c. There is likewiſe the ember-gooſe, which is ſaid to hatch her egg under her wing. Eagles and hawks, as alſo ravens, crows, mews, &c. abound here.

All theſe iſlands are well watered; for there are everywhere excellent ſprings, ſome of them mineral and medicinal. They have indeed no rivers; but many pleaſant rills or rivulets, of different ſizes; in ſome of the largeſt they have admirable trouts, ſome of which are of 15 and even of 20 pounds weight. They have likewiſe

Shetland. likewiſe many freſh-water lakes, well ſtored with trout and eels, and in moſt of them there are alſo large and fine flounders; in ſome very excellent cod. Theſe freſh-water lakes, if the country was better peopled, and the common people more at their eaſe, are certainly capable of great improvements. The ſea-coaſts of the Main-land of Shetland, in a ſtraight line, are 55 leagues; and therefore there cannot be a country conceived more proper for eſtabliſhing an extenſive fiſhery. What the inhabitants have been hitherto able to do, their natural advantages conſidered, does not deſerve that name, notwithſtanding they export large quantities of cod, tuſk, ling, and ſkate, inſomuch that the bounty allowed by acts of parliament amounts from 1400l. to 2000l. annually. They have, beſides, haddocks, whitings, turbot, and a variety of other fiſh. In many of the inlets there are prodigious quantities of excellent oyſters, lobſters, muſcles, cockles, and other ſhell-fiſh. As to amphibious creatures, they have multitudes of otters and ſeals; add to theſe, that amber, ambergris, and other ſpoils of the ocean, are ſometimes found upon the coaſts.

The inhabitants are a ſtout, well-made, comely people; the lower ſort of a ſwarthy complexion. The gentry are allowed, by all who have converſed with them, to be moſt of them polite, ſhrewd, ſenſible, lively, active, and intelligent perſons; and theſe, to the number of 100 families, have very handſome, ſtrong, well-built houſes, neatly furniſhed; their tables well ſerved; poliſhed in their manners, and exceedingly hoſpitable and civil to ſtrangers. Thoſe of an inferior rank are a hardy, robuſt, and laborious people, who, generally ſpeaking, get their bread by fiſhing in all weathers in their yawls, which are little bigger than Graveſend wherries; live hardily, and in the ſummer ſeaſon moſtly on fiſh; their drink, which, in reference to the Britiſh dominions, is peculiar to the country, is called *bland*, and is a ſort of butter-milk, long kept, and very ſour. Many live to great ages, though not ſo long as in former times. In reſpect, however, to the bulk of the inhabitants, from the poorneſs of living, from the nature of it, and from the drinking great quantities of corn-ſpirits of the very worſt ſort, multitudes are afflicted with an inveterate ſcurvy; from which thoſe in better circumſtances are entirely free, and enjoy as good health as in any other country in Europe. As they have no great turn to agriculture, and are perſuaded that their country is not fit for it, they do not (though probably they might) raiſe corn enough to ſupport them for more than two-thirds of the year. But they are much more ſucceſsful in their paſture-grounds, which are kept well incloſed, in good order, and, together with their commons, ſupply them plentifully with beef and mutton. They pay their rents generally in butter at Lammas, and in money at Martinmas. As to manufactures, they make a ſtrong coarſe cloth for their own uſe, as alſo linen. They make likewiſe of their own wool very fine ſtockings. They export, beſides the different kinds of fiſh already mentioned, ſome herrings, a conſiderable quantity of butter and train-oil, otter and ſeal ſkins, and no inconſiderable quantity of the fine ſtockings juſt mentioned. Their chief trade is to Leith, London, Hamburgh, Spain, and to the Straits. They import timbers, deals, and ſome of their beſt oats, from Norway; corn and flour from the Orkneys, and from North Britain; ſpirits and ſome other things from Hamburgh; cloths and better ſort of linen from Leith; grocery, houſehold furniture, and other neceſſaries, from London. The ſuperior-duties to the earl of Morton are generally let in farm; and are paid by the people in butter, oil, and money. The remains of the old Norwegian conſtitution are ſtill viſible in the diviſion of their lands; and they have ſome udalmen or freeholders amongſt them. But the Scots laws, cuſtoms, manners, dreſs, and language, prevail; and they have a ſheriff, and other magiſtrates for the adminiſtration of juſtice, as well as a cuſtomhouſe, with a proper number of officers. In reference to their eccleſiaſtical concerns, they have a preſbytery, 12 miniſters, and an itinerant for Foula, Fair Iſland, and the Skerries. Each of theſe miniſters has a ſtipend of between 40 and 50 pounds, beſides a houſe and a glebe free from taxes. The number of ſouls in theſe iſlands may be about 20,000. Shetland || Shield.

SHEW-BREAD, the loaves of bread which the prieſt of the week put every Sabbath-day upon the golden-table in the ſanctuary, before the Lord, in the temple of the Jews. They were twelve in number, and were offered to God in the name of the twelve tribes of Iſrael. They were ſhaped like a brick, were ten palms long and five broad, weighing about eight pounds each. They were unleavened, and made of fine flour by the Levites. The prieſts ſet them on the table in two rows, ſix in a row, and put frankincenſe upon them to preſerve them from moulding. They were changed every Sabbath, and the old ones belonged to the prieſt upon duty. Of this bread none but the prieſts might eat, except in caſes of neceſſity. It was called the *bread of faces*, becauſe the table of the ſhew-bread, being almoſt over-againſt the ark of the covenant, the loaves might be ſaid to be ſet before the face of God. The original table was carried away to Babylon, but a new one was made for the ſecond temple. It was of wood overlaid with gold. This, with the candleſtick and ſome other ſpoils, was carried by Titus to Rome.

SHIELD, an ancient weapon of defence, in form of a light buckler, borne on the arm to fend off lances, darts, &c. The form of the ſhield is repreſented by the eſcutcheon in coats of arms. The ſhield was that part of the ancient armour on which the perſons of diſtinction in the field of battle always had their arms painted; and moſt of the words uſed at this time to expreſs the ſpace that holds the arms of families are derived from the Latin name for a ſhield, *ſcutum*. The French *eſcu* and *eſcuſſion*, and the Engliſh word *eſcutcheon*, or, as we commonly ſpeak it, *ſcutcheon*, are evidently from this origin; and the Italian *ſcudo* ſignifies both the ſhield of arms and that uſed in war. The Latin name *clypeus*, for the ſame thing, ſeems alſo to be derived from the Greek word γλυφειν, *to engrave;* and it had this name from the ſeveral figures engraved on it, as marks of diſtinction of the perſon who wore it.

The ſhield in war, among the Greeks and Romans, was not only uſeful in the defence of the body, but it was alſo a token, or badge of honour, to the wearer; and he who returned from battle without it was always treated with infamy afterwards. People have at all times thought this honourable piece of the armour the propereſt place to engrave, or figure on the ſigns of dignity of the poſſeſſor of it; and hence, when arms came to be painted for families in aftertimes, the heralds always

Shield. ways chofe to repreſent them upon the figure of a ſhield, but with ſeveral exterior additions and ornaments; as the helmet, ſupporters, and the reſt.

The form of the ſhield has not only been found different in various nations, but even the people of the ſame nation, at different times, have varied its form extremely; and among ſeveral people there have been ſhields of ſeveral forms and ſizes in uſe, at the ſame period of time, and ſuited to different occaſions. The moſt ancient and univerſal form of ſhields, in the earlier ages, ſeems to have been the triangular. This we ſee inſtances of in all the monuments and gems of antiquity: our own moſt early monuments ſhow it to have been the moſt antique ſhape alſo with us, and the heralds have found it the moſt convenient for their purpoſes, when they had any odd number of figures to repreſent; as if three, then two in the broad bottom part, and one in the narrow upper end, it held them very well; or if five, they ſtood as conveniently, as three below, and two above. The other form of a ſhield, now univerſally uſed, is ſquare, rounded and pointed at the bottom: this is taken from the figure of the Samnitic ſhield uſed by the Romans, and ſince copied very generally by the Engliſh, French, and Germans.

The Spaniards and Portugueſe have the like general form of ſhields, but they are round at the bottom without the point; and the Germans, beſide the Samnite-ſhield, have two others pretty much in uſe: theſe are, 1. The bulging ſhield, diſtinguiſhed by its ſwelling or bulging out at the flanks; and, 2. The indented ſhield, or ſhield chancree, which has a number of notches and indentings all round its ſides. The uſe of the ancient ſhield of this form was, that the notches ſerved to reſt the lance upon, that it might be firm while it gave the thruſt; but this form being leſs proper for the receiving armorial figures, the two former have been much more uſed in the heraldry of that nation.

Beſide this different form of the ſhields in heraldry, we find them alſo often diſtinguiſhed by their different poſitions, ſome of them ſtanding erect, and others ſlanting various ways, and in different degrees; this the heralds expreſs by the word *pendant*, "hanging," they ſeeming to be hung up not by the centre, but by the right or left corner. The French call theſe *ecu pendant*, and the common antique triangular ones *ecu ancien*. The Italians call this *ſcuto pendente;* and the reaſon given for exhibiting the ſhield in theſe figures in heraldry is, that in the ancient tilts and tournaments, they who were to juſt at theſe military exerciſes, were obliged to hang up their ſhields with their armories, or coats of arms on them, out at the windows and balconies of the houſes near the place; or upon trees, pavilions, or the barriers of the ground, if the exerciſe was to be performed in the field.

Thoſe who were to fight on foot, according to Columbier, had their ſhields hung up by the right corner, and thoſe who were to fight on horſeback had theirs hung up by the left. This poſition of the ſhields in heraldry is called *couche* by ſome writers, though by the generality *pendant*.

It was very frequent in all parts of Europe, in arms given between the 11th and 14th centuries; but it is to be obſerved, that the hanging by the left corner, as it was the token of the owner's being to fight on horſeback, ſo it was eſteemed the moſt honourable and noble ſituation; and all the pendant ſhields of the ſons of the royal family of Scotland and England, and of our nobility at that time, are thus hanging from the left corner. The hanging from this corner was a token of the owner's being of noble birth, and having fought in the tournaments before; but no ſovereign ever had a ſhield pendant any way, but always erect, as they never formally entered the liſts of the tournament. Shield || Shifting.

The Italians generally have their ſhields of arms of an oval form; this ſeems to be done in imitation of thoſe of the popes and other dignified clergy: but their herald Petro Sancto ſeems to regret the uſe of this figure of the ſhield, as an innovation brought in by the painters and engravers as moſt convenient for holding the figures, but derogatory to the honour of the poſſeſſor, as not repreſenting either antiquity or honours won in war, but rather the honours of ſome citizen or perſon of learning. Some have carried it ſo far as to ſay, that thoſe who either have no ancient title to nobility, or have ſullied it by any unworthy action, cannot any longer wear their arms in ſhields properly figured, but were obliged to have them painted in an oval or round ſhield.

In Flanders, where this author lived, the round and oval ſhields are in the diſrepute he ſpeaks of; but in Italy, beſide the popes and dignified prelates, many of the firſt families of the laity have them.

The ſecular princes, in many other countries, alſo retain this form of the ſhield, as the moſt ancient and truly expreſſive of the Roman clypeus.

SHIELD, in *Heraldry*, the eſcutcheon or field on which the bearings of coats of arms are placed. See HERALDRY.

SHIELDRAKE, or SHELDRAKE. See ANAS, ORNITHOLOGY *Index*.

SHIELDS, NORTH and SOUTH, two ſea-port towns, at the mouth of the Tyne, the one in Northumberland, the other in the county of Durham. South Shields contained above 200 ſalt-pans, 50 years ago; but now there are not more than five or ſix; and the duty, which is now only 10,000l. per annum, amounted formerly to 80,000l. South Shields has a conſiderable trade, in which not leſs than 500 veſſels from 100 to 500 tons burden are employed; and has nine dry docks for repairing, and 10 yards for building ſhips. This town has been much improved of late years. In the centre there is a large ſquare, in which there is a handſome town-hall, with a colonnade under it for the weekly market, and from which ſtreets branch out on all ſides. North Shields contains alſo ſome fine ſtreets and ſquares. The harbour is very commodious, and ſo ſpacious, that it is capable of receiving 2000 ſhips. It is defended by a fort, in which there is alſo a lighthouſe, correſponding with another on the top of the bank, to direct veſſels into the harbour. The population of North and South Shields is eſtimated at 25,000. W. Long. 1. 12. N. Lat. 55. 44.

SHIFTERS, on board a man of war, certain men who are employed by the cooks to ſhift and change the water in which the fleſh or fiſh is put, and laid for ſome time, in order to fit it for the kettle.

SHIFTING A TACKLE, in ſea-language, the act of removing the blocks of a tackle to a greater diſtance from each other, on the object to which they are applied, in order to give a greater ſcope or extent to their purchaſe. This operation is otherwiſe called *fleeting*. Shifting the helm denotes the alteration of its poſition, by

Shilling. by puſhing it towards the oppoſite ſide of the ſhip. Shifting the voyal, ſignifies changing its poſition on the capſtern, from the right to the left, and *vice verſa*.

SHILLING, an Engliſh ſilver coin, equal to twelve pence, or the twentieth part of a pound.

Freherus derives the Saxon *ſcilling*, whence our ſhilling, from a corruption of *ſiliqua*; proving the derivation by ſeveral texts of law, and, among others, by the 26th law, *De annuis legatis*. Skinner deduces it from the Saxon *ſcild*, "ſhield," by reaſon of the eſcutcheon of arms thereon.

Biſhop Hooper derives it from the Arabic *ſcheele*, ſignifying *a weight*; but others, with greater probability, deduce it from the Latin *ſicilicus*, which ſignified in that language *a quarter of an ounce*, or the 48th part of a Roman pound. In confirmation of this etymology it is alleged, that the ſhilling kept its original ſignification, and bore the ſame proportion to the Saxon pound as ſicilicus did to the Roman and the Greek, being exactly the 48th part of the Saxon pound; a diſcovery which we owe to Mr Lambarde *.

* *Explicatio Rerum et Verborum in Leg. Sax. voc. Libra.*

However, the Saxon laws reckon the pound in the round number at 50 ſhillings, but they really coined out of it only 48; the value of the ſhilling was fivepence; but it was reduced to fourpence above a century before the conqueſt; for ſeveral of the Saxon laws, made in Athelſtan's reign, oblige us to take this eſtimate. Thus it continued to the Norman times, as one of the Conqueror's laws ſufficiently aſcertains; and it ſeems to have been the common coin by which the Engliſh payments were adjuſted. After the conqueſt, the French *ſolidus* of twelvepence, which was in uſe among the Normans, was called by the Engliſh name of ſhilling; and the Saxon ſhilling of fourpence took a Norman name, and was called the *groat*, or great coin, becauſe it was the largeſt Engliſh coin then known in England.

It has been the opinion of the biſhops Fleetwood and Gibſon, and of the antiquaries in general, that, though the method of reckoning by pounds, marks, and ſhillings, as well as by pence and farthings, had been in conſtant uſe even from the Saxon times, long before the Norman conqueſt, there never was ſuch a coin in England as either a pound or a mark, nor any ſhilling, till the year 1504 or 1505, when a few ſilver ſhillings or twelvepences were coined, which have long ſince been ſolely confined to the cabinets of collectors.

Mr Clarke combats this opinion, alleging that ſome coins mentioned by Mr Folkes, under Edward I. were probably Saxon ſhillings new minted, and that Archbiſhop Aelfric expreſsly ſays †, that the Saxons had three names for their money, viz. mancuſes, ſhillings, and pennies. He alſo urges the different value of the Saxon ſhilling at different times, and its uniform proportion to the pound, as an argument that their ſhilling was a coin; and the teſtimony of the Saxon goſpels, in which the word we have tranſlated *pieces of ſilver* is rendered *ſhillings*, which, he ſays, they would hardly have done, if there had been no ſuch coin as a ſhilling then in uſe. Accordingly the Saxons expreſſed their ſhilling in Latin by *ſiclus* and *argenteus*. He farther adds, that the Saxon ſhilling was never expreſſed by *ſolidus* till after the Norman ſettlements in England; and howſoever it altered during the long period that elapſed from the conqueſt to the time of Henry VII. it was the moſt conſtant denomination of money in all payments, though it was then only a ſpecies of account, or the twentieth part of the pound ſterling: and when it was again revived as a coin, it leſſened gradually as the pound ſterling leſſened, from the 28th of Edward III. to the 43d of Elizabeth.

† *Gram. Saxon*, P. 52.

In the year 1560 there was a peculiar ſort of ſhilling ſtruck in Ireland, of the value of ninepence Engliſh, which paſſed in Ireland for twelvepence. The motto on the reverſe was, *poſui Deum adjutorem meum*. Eighty-two of theſe ſhillings, according to Malynes, went to the pound; they therefore weighed 20 grains, one-fourth each, which is ſomewhat heavier in proportion than the Engliſh ſhilling of that time, 62 whereof went to the pound, each weighing 92 grains ſeven-eighths; and the Iriſh ſhilling being valued at the Tower at ninepence Engliſh, that is, one-fourth part leſs than the Engliſh ſhilling, it ſhould therefore proportionably weigh one-fourth part leſs, and its full weight be ſomewhat more than 62 grains; but ſome of them found at this time, though much worn, weighed 69 grains. In the year 1598, five different pieces of money of this kind were ſtruck in England for the ſervice of the kingdom of Ireland. Theſe were ſhillings to be current in Ireland at twelvepence each; half ſhillings to be current at ſixpence, and quarter ſhillings at threepence. Pennies and halfpennies were alſo ſtruck of the ſame kind, and ſent over for the payment of the army in Ireland. The money thus coined was of a very baſe mixture of copper and ſilver; and two years after there were more pieces of the ſame kinds ſtruck for the ſame ſervice, which were ſtill worſe; the former being three ounces of ſilver to nine ounces of copper; and theſe latter only two ounces eighteen pennyweights to nine ounces two pennyweights of the alloy.

The Dutch, Flemiſh, and Germans, have likewiſe their ſhilling, called *ſchelin*, *ſchilling*, *ſcalin*, &c. but theſe not being of the ſame weight or fineneſs with the Engliſh ſhilling, are not current at the ſame value. The Engliſh ſhilling is worth about 23 French ſols; thoſe of Holland and Germany about 11 ſols and a half; thoſe of Flanders about nine. The Dutch ſhillings are alſo called *ſols de gros*, becauſe equal to twelve gros. The Danes have copper ſhillings worth about one-fourth of a farthing ſterling.

Shilluk.

SHILLUK, a town in Africa on the banks of the true Nile. The houſes are built of clay, and the clothing of the inhabitants conſiſts of long graſs, which they paſs round the waiſt and between the thighs. They are all black, and both ſexes ſhave their heads. Theſe people have the dominion of the river, and exact toll of all paſſengers. The meaning of the word Shilluk ſeems to be unknown. When they tranſport Mahometans acroſs the ferry, they ſometimes ſhew the importance which their ſituation gives them. After the Mahometan has placed himſelf in the boat, they aſk him, who is the maſter of that river? The other replies Ulloh or Rubbaric, God is the maſter of it. No, you muſt ſay that ſuch a one (naming his chief) is the maſter of it, or you ſhall not paſs. They are ſaid to be hoſpitable to ſuch as come among them in a peaceable manner, and as never betraying thoſe to whom they have once afforded protection. The particulars of their worſhip have not been deſcribed. Shilluk, according to Mr Browne's map, is in 13° N. Lat. 32° 26′ E. Long.

Shiloh.

SHILOH, is a term famous among interpreters and commentators upon Scripture. It is found (Gen. xlix. 10.) to denote the Meſſiah. The patriarch Jacob foretells his coming in theſe words; "The ſceptre ſhall not depart from Judah, nor a lawgiver from between his feet, until Shiloh come; and unto him ſhall the gathering of the people be." The Hebrew text reads, יבא שלה עד כי *until Shiloh come.* All Chriſtian commentators agree, that this word ought to be underſtood of the Meſſiah, or Jeſus Chriſt; but all are not agreed about its literal and grammatical ſignification. St Jerome, who tranſlates it by *Qui mittendus eſt*, manifeſtly reads *Shiloach* "ſent," inſtead of *Shiloh*. The Septuagint have it Εως αν ελθη τα αποκειμενα αυτω; or, Εως αν ελθη ω αποκειται, (as if they had read שלו inſtead of שלה), i. e. "Until the coming of him to whom it is reſerved;" or, "Till we ſee arive that which is reſerved for him."

It muſt be owned, that the ſignification of the Hebrew word *Shiloh* is not well known. Some tranſlate, "the ſceptre ſhall not depart from Judah, till he comes to whom it belongs;" שלו or שלי inſtead of לי אשר. Others, "till the coming of the peace-maker;" or, "the pacific;" or, "of proſperity," שלה *proſperatus eſt. Shalah* ſignifies, "to be in peace, to be in proſperity;" others, "till the birth of him who ſhall be born of a woman that ſhall conceive without the knowledge of a man," שלא or שלא *fecundina, fluxus* *; otherwiſe, "the ſceptre ſhall not depart from Judah, till its end, its ruin; till the downfal of the kingdom of the Jews," שאל or שלה *it has ceaſed, it has finiſhed* †. Some Rabbins have taken the name *Siloh* or *Shiloh*, as if it ſignified the city of this name in Paleſtine: "The ſceptre ſhall not be taken away from Judah till it comes to Shiloh; till it ſhall be taken from him to be given to Saul at Shiloh." But in what part of Scripture is it ſaid, that Saul was acknowledged as king or conſecrated at Shiloh? If we would underſtand it of Jeroboam the ſon of Nebat, the matter is ſtill as uncertain. The Scripture mentions no aſſembly at Shiloh that admitted him as king. A more modern author derives *Shiloh* from שלה, *fatigare*, which ſometimes ſignifies *to be weary, to ſuffer*; "till his labours, his ſufferings, his paſſion, ſhall happen."

* *Arab. Lud. de Dieu.*

† *Le Clerc in Geneſ.*

But not to amuſe ourſelves about ſeeking out the grammatical ſignification of Shiloh, it is ſufficient for us to ſhow, that the ancient Jews are in this matter agreed with the Chriſtians: they acknowledge, that this word ſtands for the *Meſſiah the King*. It is thus that the paraphraſts Onkelos and Jonathan, that the ancient Hebrew commentaries upon Geneſis, and that the Talmudiſts themſelves, explain it. If Jeſus Chriſt and his apoſtles did not make uſe of this paſſage to prove the coming of the Meſſiah, it was becauſe then the completion of this prophecy was not ſufficiently manifeſt. The ſceptre ſtill continued among the Jews; they had ſtill kings of their own nation in the perſons of the Herods; but ſoon after the ſceptre was entirely taken away from them, and has never been reſtored to them ſince.

The Jews ſeek in vain to put forced meanings upon this prophecy of Jacob; ſaying, for example, that the ſceptre intimates the dominion of ſtrangers, to which they have been in ſubjection, or the hope of ſeeing one day the ſceptre or ſupreme power ſettled again among themſelves. It is eaſy to perceive, that all this is contrived to deliver themſelves out of perplexity. In vain likewiſe they take refuge in certain princes of the captivity, whom they pretend to have ſubſiſted beyond the Euphrates, exerciſing an authority over their nation little differing from abſolute, and being of the race of David. This pretended ſucceſſion of princes is perfectly chimerical; and though at certain times they could ſhow a ſucceſſion, it continued but a ſhort time, and their authority was too obſcure, and too much limited, to be the object of a prophecy ſo remarkable as this was.

Shiloh ‖ Ship.

SHINGLES, in building, ſmall pieces of wood, or quartered oaken boards, ſawn to a certain ſcantling, or, as is more uſual, cleft to about an inch thick at one end, and made like wedges, four or five inches broad, and eight or nine inches long.

Shingles are uſed inſtead of tiles or ſlates, eſpecially for churches and ſteeples; however, this covering is dear; yet, where tiles are very ſcarce, and a light covering is required, it is preferable to thatch; and where they are made of good oak, cleft, and not ſawed, and well ſeaſoned in water and the ſun, they make a ſure, light, and durable covering.

The building is firſt to be covered all over with boards, and the ſhingles nailed upon them.

SHIP, a general name for all large veſſels, particularly thoſe equipped with three maſts and a bowſprit; the maſts being compoſed of a lowermaſt, topmaſt, and top-gallant-maſt: each of theſe being provided with yards, ſails, &c. Ships, in general, are either employed for war or merchandiſe.

SHIPS of War are veſſels properly equipped with artillery, ammunition, and all the neceſſary martial weapons and inſtruments for attack or defence. They are diſtinguiſhed from each other by their ſeveral ranks or claſſes, called *rates*, as follows: Ships of the firſt rate mount from 100 guns to 110 guns and upwards; ſecond rate, from 90 to 98 guns; third rate, from 64 to 74 guns; fourth rate, from 50 to 60 guns; fifth rate, from 32 to 44 guns; and ſixth rates, from 20 to 28 guns. See the article RATE. Veſſels carrying leſs than 20 guns are denominated *ſloops*, *cutters*, *fire-ſhips* and *bombs*. It has lately been propoſed to reduce the number of theſe rates, which would be a ſaving to the nation, and alſo productive of ſeveral material advantages.

In Plate CCCCLXXX. is the repreſentation of a firſt rate, with rigging, &c. the ſeveral parts of which are as follows:

Plate CCCCLXXX Fig. 1.

Parts of the hull.—Fig. 1. A, The cathead; B, The fore-chain-wales, or chains; C, The main-chains; D, The mizen-chains; E, The entering port; F, The hawſe-holes; G, The poop-lanterns; H, The cheſs-tree; I, The head; K, The ſtern.

1, The bowſprit. 2, Yard and ſail. 3, Gammoning. 4, Manrop. 5, Bobſtay. 6, Spritſail-ſheets. 7, Pendants. 8, Braces and pendants. 9, Halliards. 10, Lifts. 11, Clue-lines. 12, Spritſail-horſes. 13, Buntlines. 14, Standing lifts. 15, Bowſprit-ſhroud. 16, Jib-boom. 17, Jibſtay and ſail. 18, Halliards. 19, Sheets. 20, Horſes. 21, Jib-guy. 12, Spritſail-topſail yard. 23, Horſes. 24, Sheets. 25, Lifts. 26, Braces and pendants. 27, Cap of bowſprit. 28, Jack ſtaff. 29, Truck. 30, Jack flag.—31, *Foremaſt.* 32, Runner and tackle. 33, Shrouds. 34, Laniards. 35, Stay and laniard. 36, Preventer-ſtay and laniard. 37, Woolding of the maſt. 38, Foreyard and ſail. 39, Horſes.

Ship. Horſes. 40, Top. 41, Crowfoot. 42, Jeers. 43, Yard-tackles. 44, Lifts. 45, Braces and pendants. 46, Sheets. 47, Foretacks. 48, Bowlines and bridles. 49, Fore buntlines. 50, Fore leechlines. 51, Preventer-brace. 52, Futtock-ſhrouds.—53, *Foretop-maſt.* 54, Shrouds and laniards. 55, Foretop-ſail yard and ſail. 56, Stay and ſail. 57, Runner. 58, Backſtays. 59, Halliards. 60, Lifts. 61, Braces and pendants. 62, Horſes. 63, Clew-lines. 64, Bowlines and bridles. 65, Reef-tackles. 66, Sheets. 67, Buntlines. 68, Croſs trees. 69, Cap. 70, Foretop-gallant-maſt. 71, Shrouds. 72, Yard and ſail. 73, Backſtays. 74, Stay. 75, Lifts. 76, Clewlines. 77, Braces and pendants. 78, Bowlines and bridles. 79, Flag-ſtaff. 80, Truck. 81, Flag-ſtay-ſtaff. 82, Flag of the lord high admiral.—83, *Mainmaſt.* 84, Shrouds. 85, Laniards. 86, Runner and tackle. 87, Futtock-ſhrouds. 88, Top-lantern. 89, Crank of ditto. 90, Stay. 91. Preventer-ſtay. 92, Stay-tackles. 93, Woolding of the maſt. 94, Jeers. 95, Yard-tackles. 96, Lifts. 97, Braces and pendants. 98, Horſes. 99, Sheets. 100, Tacks. 101, Bowlines and bridles. 102, Crow-foot. 103, Cap. 104, Top. 105, Buntlines. 106, Leechlines. 107, Yard and ſail.—108, *Main-topmaſt.* 109, Shrouds and laniards. 110, Yard and ſail. 111, Futtock-ſhrouds. 112, Backſtays. 113, Stay. 114, Stayſail and halliards. 115, Tye. 116, Halliards. 117, Lifts. 118, Clewlines. 119, Braces and pendants. 120, Horſes. 121, Sheets. 122, Bowlines and bridles. 123, Buntlines. 124, Reef-tackles. 125, Croſs-trees. 126, Cap.—127, *Maintop gallantmaſt.* 128, Shroud. and laniards. 129, Yard and ſail. 130, Backſtays. 131, Stay. 132, Stayſail and halliards. 133, Lifts. 134, Braces and pendants. 135, Bowlines and bridles, 136, Clewlines. 137, Flagſtaff. 138, Truck. 139 Flagſtaff-ſtay. 140, Flag ſtandard.—141, *Mizenmaſt.* 142, Shrouds and laniards. 143, Cap. 144, Yard and ſail. 145, Block for ſignal halliards. 146, Sheet, 147, Pendant lines. 148, Peckbrails. 149, Stayſail. 150, Stay. 151, Derrick and ſpan. 152, Top. 153, Croſsjack yard. 154, Croſsjack lifts. 155, Croſsjack braces. 156, Croſsjack ſlings.—157, *Mizentop-maſt.* 158, Shrouds and laniards. 159, Yard and ſail. 160, Backſtays. 161, Stay. 162, Halliards. 163, Lifts. 164, Braces and pendants. 165, Bowlines and bridles. 166, Sheets. 167, Clewlines. 168, Stayſail. 169, Croſstrees. 170, Cap. 171, Flagſtaff. 172, Flagſtaff-ſtay. 173, Truck. 174, Flag, union. 175, Enſign-ſtaff. 176, Truck. 177, Enſign. 178, Stern ladder. 179, Bower cable.

Plate CCCCLXXXI. Fig. 2. Fig. 2. Plate CCCCLXXXI. is a vertical longitudinal ſection of a firſt rate ſhip of war, with references to the principal parts, which are as follows:

A, Is the head, containing,—1, The ſtem; 2, The knee of the head or cutwater; 3, The lower and upper cheek; 4, The trail-board; 5, The figure; 6, The gratings; 7, The brackets; 8, The falſe ſtem; 9, The breaſt hooks; 10, The hauſe holes; 11, The bulkhead forward; 12, The cathead; 13, The cathook; 14, Neceſſary ſeats; 15, The manger within board; 16, The bowſprit.

B, Upon the forecaſtle—17, The gratings; 18, The partners of the maſt; 19, The gunwale; 20, The belfry; 21, The funnel for ſmoke; 22. The gangway going off the forecaſtle; 23, The forecaſtle guns.

C, In the forecaſtle—24, The door of the bulkhead forward; 25, Officers cabins; 26, Staircaſe; 27, Foretop-ſail ſheet bits; 28, The beams; 29, The carlings. Ship.

D, The middle gun deck forward—30, The fore-jeer bits; 31, The oven and furnace of copper; 32, The captain's cook room; 33, The ladder or way to the forecaſtle.

E, The lower gun-deck forward—34, The knees fore and aft; 35, The ſpirketings, or the firſt ſtreak next to each deck, the next under the beams being called *clamps;* 36. The beams of the middle gun deck fore and aft; 37, The carlings of the middle gun-deck fore and aft; 38, The fore-bits; 39, The after or main bits; 40. The hatchway to the gunner's and boatſwain's ſtore-rooms; 41. The jeer capſtan.

F, The orlop—42, 43, 44, The gunner's, boatſwain's, and carpenter's ſtore-rooms; 45, The beams of the lower gun-deck; 46, 47, The pillars and the riders, fore and aft; 48, The bulkhead of the ſtore-rooms.

G, The hold—49, 50, 51, The foot-hook rider, the floor rider, and the ſtandard, fore and aft; 52, The pillars; 53, The ſtep of the foremaſt; 54, The kelſon, or falſe keel, and dead riſing; 55, The dead-wood.

H, At midſhips in the hold—56, The floor-timbers; 57, The keel; 58, The well; 59, The chain-pump; 60, The ſtep of the mainmaſt; 61, 62, Beams and carlings of the orlop, fore and aft.

I, The orlop amidſhips—63, The cable tire; 64, The main hatchway.

K, The lower gun-deck amidſhips—65, The ladder leading up to the middle gun-deck; 66, The lower tire of ports.

L, The middle gun-deck amidſhip—67, The middle tire of ports; 68, The entering port; 69, The main jeer bits; 70, Twiſted pillars or ſtanchions; 71, The capſtan; 72, Gratings; 73, The ladder leading to the upper deck.

M, The upper gun-deck amidſhips—74, The main-topſail-ſheet bits; 75, The upper partners of the main-maſt; 76, The gallows on which ſpare topmaſts &c. are laid; 77, The foreſheet blocks; 78, The rennets; 79, The gunwale; 80, The upper gratings; 81, The drift brackets; 82, The piſs dale; 83, The capſtan pall.

N, Abaft the mainmaſt—84, The gangway off the quarterdeck; 85, The bulkhead of the coach; 86, The ſtaircaſe down to the middle gun-deck; 87, The beams of the upper deck; 88, The gratings about the main-maſt; 89, The coach or council-chamber; 90, The ſtaircaſe up to the quarterdeck.

O, The quarterdeck—91, The beams; 92, The carlings; 93, The partners of the mizenmaſt; 94, The gangway up to the poop; 95, The bulkhead of the cuddy.

P, The poop—96, The trumpeter's cabin; 97, The taffarel.

Q, The captain's cabin.

R, The cuddy, uſually divided for the maſter and ſecretary's officers.

S, The ſtate-room, out of which is made the bed-chamber and other conveniences for the commander in chief; 98, The entrance into the gallery; 99, The bulkhead of the great cabin; 100, The ſtern lights and after galleries.

T, The ward-room, allotted for the lieutenants and

Ship. marine officers: 101, The lower gallery; 102, The ſteerage and bulkhead of the wardroom; 103, The whipſtaff, commanding the tiller; 104, The after ſtair-caſe leading down to the lower gun-deck.

V, Several officers cabins abaft the mainmaſt, where the ſoldiers generally keep guard.

W, The gun room—105, The tiller commanding the rudder; 106, The rudder; 107, The ſtern-poſt; 108, The tiller tranſom; 109, The ſeveral tranſoms, viz. 1, 2, 3, 4, 5; 110, The gun-room ports, or ſtern-chaſe; 111, The bread-room ſcuttle, out of the gun-room; 112, The main capſtan; 113, The pall of the capſtan; 114, The partner; 115, The bulkhead of the bread-room.

X, The bread-room.

Y, The ſteward's room, where all proviſions are weighed and ſerved out.

Z, The cockpit, where are ſubdiviſions for the purſer, the ſurgeon, and his mates.

AA, The platform or orlop, where proviſion is made for the wounded in the time of ſervice; 116, The hold abaft the main-maſt; 117, The ſtep of the mizen-maſt; 118, The kelſon, or falſe keel; 119, The dead wood, or riſing.

Ships of war are fitted out either at the expence of the ſtate or by individuals. Thoſe fitted out at the public expence are called *King's ſhips*, and are divided into *ſhips of the line*, *frigates*, *ſloops*, &c. For an account of each of theſe, ſee the reſpective articles. Ships of war fitted out by individuals are called *privateers*. See the article PRIVATEER.

Armed-SHIP. See *ARMED-Ship*.

Bomb-SHIP. See *BOMB Veſſels*.

Double-SHIP. See *SHIP-Building*.

Fire-SHIP. See *FIRE-Ship*.

Hoſpital-SHIP, a veſſel fitted up to attend on a fleet of men of war, and receive their ſick or wounded; for which purpoſe her decks ſhould be high, and her ports ſufficiently large. Her cables ought alſo to run upon the upper deck, to the end that the beds or cradles may be more commodiouſly placed between decks, and admit a free paſſage of the air to diſperſe that which is offenſive or corrupted.

Merchant-SHIP, a veſſel employed in commerce to carry commodities of various ſorts from one port to another.

The largeſt merchant ſhips are thoſe employed by the different companies of merchants who trade to the Eaſt Indies. They are in general larger than our 40 gun ſhips; and are commonly mounted with 20 guns on their upper-deck, which are nine pounders; and ſix on their quarter-deck, which are ſix pounders.

Regiſter-SHIP. See *REGISTER-Ship*.

Store-SHIP, a veſſel employed to carry artillery or naval ſtores for the uſe of a fleet, fortreſs, or garriſon.

Tranſport-SHIP, is generally uſed to conduct troops from one place to another.

Beſides the different kinds of ſhips abovementioned, which are denominated from the purpoſe for which they are employed, veſſels have alſo, in general, been named according to the different manner of rigging them. It would be an endleſs, and at the ſame time an unneceſſary taſk, to enumerate all the different kinds of veſſels with reſpect to their rigging; and therefore a few only are here taken notice of. Fig. 3. is a *ſhip* which would be converted into a *bark* by ſtripping the mizen maſt of its yards and the ſails belonging to them. If each maſt, its correſponding topmaſt and topgallant-maſt, inſtead of being compoſed of ſeparate pieces of wood, were all of one continued piece, then this veſſel with very little alteration would be a *polacre*. Fig. 4. repreſents a *ſnow*; fig. 5. a *bilander*; fig. 6. a *brig*; fig. 7. a *ketch*; fig. 8. a *ſchooner*; fig. 9. a *ſloop*; fig. 10. a *zebec*; fig. 11. a *galliot*; fig. 12. a *dogger*; fig. 13. a *galley* under ſail; fig. 14. ditto rowing. Ship. Plate CCCCLXXXII. Fig. 6.

Plate CCCCLXXXI. Fig. 3.

Ships are alſo ſometimes named according to the different modes of their conſtruction. Thus we ſay, a *cat*-built ſhip, &c.

To SHIP, is either uſed actively, as to embark any perſon or put any thing aboard ſhip: or paſſively, to receive any thing into a ſhip; as, "we ſhipped a heavy ſea at three o'clock in the morning."

To SHIP, alſo implies to fix any thing in its place; as, to ſhip the oars, that is, to put them in their row-locks; to ſhip the ſwivel guns, is to fix them in their ſockets; to ſhip the handſpokes, &c.

Machine for drawing Bolts out of SHIPS, an inſtrument invented by Mr William Hill for this purpoſe. His account of which is as follows *.

"Firſt, The uſe of this machine is to draw the kelſon and dead wood bolts out, and to draw the knee of the head bolts.—Secondly, The heads of the kelſon bolts heretofore were all obliged to be driven through the kelſon, floor-timbers, and keel, to get them out; by this means the kelſon is often entirely deſtroyed, and the large hole the head makes materially wounds the floors; and frequently, when the bolt is much corroded, it ſcarfs, and the bolt comes out of the ſide of the keel.—Thirdly, The dead-wood bolts that are driven with two or three drifts, are ſeldom or never got out, by which means the dead-wood is condemned, when ſome of it is really ſerviceable.—Fourthly, In drawing the knee of the head-bolts, ſometimes the knee ſtarts off, and cannot be got to again, but furs up, and with this machine may be drawn in; for it has been proved to have more power in ſtarting a bolt than the maul."

* *Tranſactions of the Society for the Encouragement of Arts, &c.* vol. x.

Plate CCCCLXXXIII. Fig. 1.

In fig. 1. "A, A, repreſent two ſtrong male ſcrews, working in female ſcrews near the extremities of the cheeks, againſt plates of iron E, E. C C is the bolt to be drawn; which, being held between the chaps of the machine at DD, is, by turning the ſcrews by the lever B, forced upwards out of the wood or plank of the ſhip. F, F, are two dogs, with hooks at their lower extremities; which, being driven into the plank, ſerve to ſupport the machine till the chaps have got faſt hold of the bolt. At the upper part of theſe dogs are rings paſſing through holes in a collar, moveable near the heads of the ſcrews. Fig. 2. is a view of the upper ſide of the cheeks when joined together; *a*, *a*, the holes in which the ſcrews work; *b*, the chaps by which the bolts are drawn. Fig. 3. The under ſide of the cheek: *a*, *a*, the holes in which the ſcrews work; *b*, the chaps by which the bolts are drawn, and where the teeth that gripe the bolt are more diſtinctly ſhown. Fig. 4. One of the cheeks ſeparated from the other, the letters referring as in fig. 2. and 3. Fig. 2. Fig. 3. Fig. 4.

This machine was tried in his majeſty's yard at Deptford, and was found of the greateſt utility.—"Firſt, it drew a bolt that was driven down ſo tight as only to go

one

Ship.

one inch in ſixteen blows with a double headed maul, and was well clenched below: the bolt drew the ring a conſiderable way into the wood, and wire drew itſelf through, and left the ring behind. Secondly, it drew a bolt out of the Venus's dead wood that could not be got out by the maul. That part of it which went through the keel was bent cloſe up to the lower part of the dead-wood, and the machine drew the bolt ſtraight, and drew it out with eaſe. It alſo drew a kelſon bolt out of the Stanley Weſt Indiaman, in Meſſrs Well's yard, Deptford; which being a bolt of two drifts, could not be driven out.

Management of SHIPS *at ſingle anchor*, is the method of taking care of a ſhip while riding at ſingle anchor in a tide-way, by preventing her from fouling her anchor, &c. The following rules for this purpoſe, with which we have been favoured by Henry Taylor * of North Shields, will be found of the utmoſt conſequence.

* *Taylor's Inſtructions to Young Mariners Riding at Anchor in moderate Weather.*

Riding in a tide-way, with a freſh-of-wind, the ſhip ſhould have what is called *a ſhort* or *windward ſervice*, ſay 45 or 50 fathoms of cable, and always ſheered to windward (A), not always with the helm hard down, but more or leſs ſo according to the ſtrength or weakneſs of the tide. It is a known fact, that many ſhips ſheer their anchors home, drive on board of other ſhips, and on the ſands near which they rode, before it has been diſcovered that the anchor had been moved from the place where it was let go.

1 When the ſhip will back.

When the wind is croſs, or nearly croſs, off ſhore, or in the oppoſite direction, ſhips will always back. This is done by the mizen-topſail, aſſiſted, if needful, by the mizen ſtayſail; ſuch as have no mizen topſail commonly uſe the main-topſail, or if it blows freſh, a topgallant-ſail, or any ſuch ſail at the gaff.

In backing, a ſhip ſhould always wind with a taught cable, that it may be certain the anchor is drawn round. In caſe there is not a ſufficiency of wind for that purpoſe, the ſhip ſhould be hove apeak.

2 How the yards ought to be braced.

Riding with the wind afore the beam, the yards ſhould be braced forward; if abaft the beam, they are to be braced all aback.

3 Riding windward tide in danger of breaking her ſheer.

If the wind is ſo far aft that the ſhip will not back (which ſhould not be attempted if, when the tide eaſes, the ſhip forges ahead, and brings the buoy on the lee quarter), ſhe muſt be ſet ahead: if the wind is far aft, and blows freſh, the utmoſt care and attention is neceſſary, as ſhips riding in this ſituation often break their ſheer, and come to windward of their anchors again. It ſhould be obſerved, that when the ſhip lies in this tickliſh ſituation, the after-yards muſt be braced forward, and the fore-yards the contrary way: ſhe will lay ſafe, as the buoy can be kept on the lee quarter, or ſuppoſe the helm is aport, as long as the buoy is on the larboard quarter. With the helm thus, and the wind right aft, or nearly ſo, the ſtarboard main and fore braces ſhould be hauled in. This ſuppoſes the main braces to lead forward.

Ship.

4 Tending to leeward when the ſhip muſt be ſet a-head.

When the ſhip begins to tend to leeward, and the buoy comes on the weather-quarter, the firſt thing to be done is to brace about the fore-yard; and when the wind comes near the beam, ſet the fore-ſtayſail, and keep it ſtanding until it ſhakes; then brace all the yards ſharp forward, eſpecially if it is likely to blow ſtrong.

5 How to manage when the ſhip breaks her ſheer.

If laying in the aforeſaid poſition, and ſhe breaks her ſheer, brace about the main-yard immediately; if ſhe recovers and brings the buoy on the lee or larboard quarter, let the main-yard be again braced about; but if ſhe come to a ſheer the other way, by bringing the buoy on the other quarter, change the helm and brace the fore-yard to.

6 When a long ſervice is out, and the ſhip is likely to go to windward.

Riding leeward tide with more cable than the windward ſervice, and expecting the ſhip will go to windward of her anchor, begin as ſoon as the tide eaſes to ſhorten in the cable. This is often hard work; but it is neceſſary to be done, otherwiſe the anchor may be fouled by the great length of cable the ſhip has to draw round; but even if that could be done, the cable would be damaged againſt the bows or cut-water. It is to be obſerved, that when a ſhip rides windward tide the cable ſhould be cackled from the ſhort ſervice towards the anchor, as far as will prevent the bare part touching the ſhip.

When the ſhip tends to windward and muſt be ſet a-head, hoiſt the fore-ſtayſail as ſoon as it will ſtand, and when the buoy comes on the lee quarter, haul down the fore-ſtayſail, brace to the fore-yard, and put the helm a-lee; for till then the helm muſt be kept a-weather and the yards full.

7 How to manage in a ſtorm.

When the ſhip rides leeward tide, and the wind increaſes, care ſhould be taken to give her more cable in time, otherwiſe the anchor may ſtart, and probably it will be troubleſome to get her brought up again; and this care is the more neceſſary when the ſhip rides in the hauſe of another ſhip. Previous to giving a long ſervice it is uſual to take a weather-bit, that is, a turn of the cable over the windlaſs end, ſo that in veering away the ſhip will be under command. The ſervice ought

(A) It has been thought by ſome theoriſts, that ſhips ſhould be ſheered to leeward of their anchors; but experience and the common practice of the beſt informed ſeamen are againſt that opinion: for it is found, that when a ſhip rides leeward tide and ſheered to windward, with the wind two or three points upon the bow, and blowing hard in the interval between the ſqualls, the ſheer will draw her towards the wind's eye; ſo that when the next ſquall comes, before ſhe be preſſed aſtream of her anchor, it is probable there will be a lull again, and the ſpring which the cable got by the ſheer will greatly eaſe it during the ſquall.

Every ſeaman knows that no ſhip without a rudder, or the helm left looſe, will wear; they always in ſuch ſituations fly to: this proves that the wind preſſing upon the quarter and the helm alee, a ſhip will be leſs liable to break her ſheer than when the helm is a-weather. Beſides, if the helm is a-lee when ſhe breaks her ſheer, it will be a-weather when the wind comes on the other quarter, as it ought to be until ſhe either ſwing to leeward, or bring the buoy on the other quarter. Now if the ſhip breaks her ſheer with the helm a-weather, it throws her head to the wind ſo ſuddenly as ſcarce to give time to brace the yards about, and very probably ſhe will fall over her anchor before the fore-ſtayſail can be got up.

Ship.

ought to be greaſed, which will prevent its chafing in the hauſe.

If the gale continues to increaſe, the topmaſts ſhould be ſtruck in time; but the fore yard ſhould ſeldom, if ever, be lowered down, that in caſe of parting the foreſail may be ready to be ſet. At ſuch times there ſhould be more on deck than the common anchor-watch, that no accident may happen from inattention or falling aſleep.

In a tide-way a ſecond anchor ſhould never be let go but when abſolutely neceſſary; for a ſhip will ſometimes ride eaſier and ſafer, eſpecially if the ſea runs high, with a very long ſcope of cable and one anchor, than with leſs length and two cables; however, it is adviſable, as a preventive, when ſhips have not room to drive, and the night is dark, to let fall a ſecond anchor under foot, with a range of cable along the deck. If this is not thought neceſſary to be done, the deep-ſea lead ſhould be thrown overboard, and the line frequently handled by the watch, that they may be aſſured ſhe rides faſt.

8 Caution reſpecting the anchor watch.

If at any time the anchor-watch, preſuming on their own knowledge, ſhould wind the ſhip, or ſuffer her to break her ſheer without calling the mate, he ſhould immediately, or the very firſt opportunity, oblige the crew to heave the anchor in ſight; which will prevent the commiſſion of the like fault again; for beſides the ſhare of trouble the watch will have, the reſt of the crew will blame them for neglecting their duty.

9 The particular duty of the chief mate.

Prudent mates ſeldom lie a week in a road-ſtead without heaving their anchor in ſight; even though they have not the leaſt ſuſpicion of its being foul. There are other reaſons why the anchor ſhould be looked at; ſometimes the cable receives damage by ſweeping wrecks or anchors that have been loſt, or from rocks or ſtones; and it is often neceſſary to trip the anchor, in order to take a clearer birth, which ſhould be done as often as any ſhip brings up too near.

Method for the ſafe removal of ſuch SHIPS *as have been driven on ſhore.* For this purpoſe empty caſks are uſually employed to float off the veſſel, eſpecially if ſhe is ſmall, and at the ſame time near the port to which it is propoſed to conduct her. In other caſes, the following method adopted by Mr Barnard * will anſwer.

* *Philoſophical Tranſactions*, vol. lxx. part 1.

"On January 1. 1779 (ſays Mr Barnard), in a moſt dreadful ſtorm, the York Eaſt Indiaman, of eight hundred tons, homeward bound, with a pepper cargo, parted her cables in Margate roads, and was driven on ſhore, within one hundred feet of the head and thirty feet of the ſide of Margate pier, then drawing twenty-two feet ſix inches water, the flow of a good ſpring tide being only fourteen feet at that place.

"On the third of the ſame month I went down, as a ſhip-builder, to aſſiſt, as much as lay in my power, my worthy friend Sir Richard Hotham, to whom the ſhip belonged. I found her perfectly upright, and her ſhere (or ſide appearance) the ſame as when firſt built, but ſunk to the twelve feet water-mark fore and aft in a bed of chalk mixed with a ſtiff blue clay, exactly the ſhape of her body below that draft of water; and from the rudder being torn from her as ſhe ſtruck coming on ſhore, and the violent agitation of the ſea after her being there, her ſtern was ſo greatly injured as to admit free acceſs thereto, which filled her for four days equal to the flow of the tide. Having fully informed myſelf of her ſituation and the flow of ſpring-tides, and being clearly of opinion ſhe might be again got off, I recommended, as the firſt neceſſary ſtep, the immediate diſcharge of the cargo; and, in the progreſs of that buſineſs, I found the tide always flowed to the ſame height on the ſhip; and when the cargo was half diſcharged, and I knew the remaining part ſhould not make her draw more than eighteen feet water, and while I was obſerving the water at twenty-two feet ſix inches by the ſhip's marks, ſhe inſtantly lifted to ſeventeen feet eight inches; the water and air being before excluded by her preſſure on the clay, and the atmoſphere acting upon her upper part equal to ſix hundred tons, which is the weight of water diſplaced at the difference of theſe two drafts of water.

Ship.

"The moment the ſhip lifted, I diſcovered ſhe had received more damage than was at firſt apprehended, her leaks being ſuch as filled her from four to eighteen feet water in an hour and a half. As nothing effectual was to be expected from pumping, ſeveral ſcuttles or holes in the ſhip's ſide were made, and valves fixed thereto, to draw off the water at the loweſt ebb of the tide, to facilitate the diſcharge of the remaining part of the cargo; and, after many attempts, I ſucceeded in an external application of ſheep-ſkins ſewed on a ſail and thruſt under the bottom, to ſtop the body of water from ruſhing ſo furiouſly into the ſhip. This buſineſs effected, moderate pumping enabled us to keep the ſhip to about ſix feet water at low water, and by a vigorous effort we could bring the ſhip ſo light as (when the cargo ſhould be all diſcharged) to be eaſily removed into deeper water. But as the external application might be diſturbed by ſo doing, or totally removed by the agitation of the ſhip, it was abſolutely neceſſary to provide ſome permanent ſecurity for the lives of thoſe who were to navigate her to the river Thames. I then recommended as the cheapeſt, quickeſt, and moſt effectual plan, to lay a deck in the hold, as low as the water could be pumped to, framed ſo ſolidly and ſecurely, and caulked ſo tight, as to ſwim the ſhip independent of her own leaky bottom.

"Beams of fir-timber twelve inches ſquare were placed in the hold under every lower-deck beam in the ſhip, as low as the water would permit; theſe were in two pieces, for the conveniency of getting them down, and alſo for the better fixing them of an exact length, and well bolted together when in their places. Over theſe were laid long Dantzic deals of two inches and a half thick, well nailed and caulked. Againſt the ſhip's ſides, all fore and aft, was well nailed a piece of fir twelve inches broad and ſix inches thick on the lower and three inches on the upper edge, to prevent the deck from riſing at the ſide. Over the deck, at every beam, was laid a croſs piece of fir timber ſix inches deep and twelve inches broad, reaching from the pillar of the hold to the ſhip's ſide, on which the ſhores were to be placed to reſiſt the preſſure of the water beneath. On each of theſe, and againſt the lower-deck beam, at equal diſtances from the ſide and middle of the ſhip, was placed an upright ſhore, ſix inches by twelve, the lower end let two inches into the croſs piece. From the foot of this ſhore to the ſhip's ſide, under the end of every lower deck beam, was placed a diagonal ſhore ſix inches by twelve, to eaſe the ſhip's deck of part of the ſtrain by throwing it on the ſide. An upright ſhore of three inches by twelve was placed from the end of every croſs

piece

Ship. piece to the lower deck beams at the ſide, and one of three inches by twelve on the midſhip end of every croſs piece to the lower deck beam, and nailed to the pillars in the hold. Two firm tight bulkheads or partitions were made as near the extremes of the ſhip as poſſible. The ceiling or inſide plank of the ſhip was very ſecurely caulked up to the lower deck, and the whole formed a complete ſhip with a flat bottom within ſide, to ſwim the outſide leaky one; and that bottom being depreſſed ſix feet below the external water, reſiſted the ſhip's weight above it equal to five hundred and eighty-one tons, and ſafely conveyed her to the dry-dock at Deptford." Ship.

SHIP-BUILDING.

1 Definition. SHIP-BUILDING, or NAVAL ARCHITECTURE, is the art of conſtructing a ſhip ſo as to anſwer a particular purpoſe either of war or merchandiſe.

2 Hiſtory. To whom the world is indebted for the invention of ſhips, is, like all other things of equal antiquity, uncertain.

A very ſmall portion of art or contrivance was ſeen in the firſt ſhips: they were neither ſtrong nor durable; but conſiſted only of a few planks laid together, without beauty or ornament, and juſt ſo compacted as to keep out the water. In ſome places they were only the hulks or ſtocks of trees hollowed, and then conſiſted only of one piece of timber. Nor was wood alone applied to this uſe; but any other buoyant materials, as the Egyptian reed papyrus; or leather, of which the primitive ſhips were frequently compoſed; the bottom and ſides being extended on a frame of thin battens or ſcantlings, of flexible wood, or begirt with wickers. ſuch as we have frequently beheld amongſt the American ſavages. In this manner they were often navigated upon the rivers of Ethiopia, Egypt, and Sabæan Arabia, even in latter times. But in the firſt of them, we find no mention of any thing but leather or hides ſewed together. In a veſſel of this kind, Dardanus ſecured his retreat to the country afterwards called *Troas*, when he was compelled by a terrible deluge to forſake his former habitation of Samothrace. According to Virgil, Charon's infernal boat was of the ſame compoſition.

But as the other arts extended their influence, naval architecture likewiſe began to emerge from the gloom of ignorance and barbariſm; and as the ſhips of thoſe ages were increaſed in bulk, and better proportioned for commerce, the appearance of the floating citadels of unuſual form, full of living men, flying with ſeemingly expanded wings over the ſurface of the untravelled ocean, ſtruck the ignorant people with terror and aſtoniſhment: and hence, as we are told by Ariſtophanes, aroſe the fable of Perſeus flying to the Gorgons, who was actually carried thither in a ſhip! Hence, in all probability, the famous ſtory of Triptolemus riding on a winged dragon is deduced, only becauſe he ſailed from Athens, in the time of great dearth, to a more plentiful country, to ſupply the neceſſities of his people. The fiction of the flying horſe Pegaſus may be joined with theſe, who, as ſeveral mythologiſts report, was nothing but a ſhip with ſails, and thence ſaid to be the offſpring of Neptune the ſovereign of the ſea; nor does there appear any other foundation for the ſtories of griffins, or of ſhips transformed into birds and fiſhes, which we ſo often meet with in the ancient poets. So acceptable to the firſt ages of the world were inventions of this nature, that whoever made any improvements in navigation or naval architecture, building new ſhips better fitted for ſtrength or ſwiftneſs than thoſe uſed before, or rendered the old more commodious by additional contrivances, or diſcovered countries unknown to former travellers, were thought worthy of the greateſt honours, and often aſſociated into the number of their deified heroes. Hence we have in aſtronomy the ſigns of Aries and Taurus, which were no other than two ſhips: the former tranſported Phryxus from Greece to Colchos, and the latter Europa from Phœnicia to Crete. Argo, Pegaſus, and Perſeus, were likewiſe new ſhips of a different ſort from the former, which being greatly admired by the barbarous and uninſtructed people of thoſe times, were tranſlated amongſt the ſtars, in commemoration of their inventors, and metamorphoſed into conſtellations by the poets of their own and of ſucceeding ages. Hiſtory.

The chief parts, of which ſhips anciently conſiſted, were three, viz. the belly, the prow, and the ſtern: theſe were again compoſed of other ſmaller parts, which ſhall be briefly deſcribed in their order. In the deſcription, we chiefly follow Scheffer, who has ſo copiouſly treated this ſubject, and with ſuch induſtry and learning collected whatever is neceſſary to illuſtrate it, that very little room is left for enlargement by thoſe who incline to purſue this inveſtigation.

1. In the belly, or middle part of the ſhip, there was τρόπις, *carina*, or the "keel," which was compoſed of wood: it was placed at the bottom of the ſhip, being deſigned to cut and glide through the waves, and therefore was not broad, but narrow and ſharp; whence it may be perceived that not all ſhips, but only the μακραὶ which ſhips of war were called, whoſe bellies were ſtraight, and of a ſmall circumference, were provided with keels, the reſt having uſually flat bottoms. Around the outſide of the keel were fixed pieces of wood, to prevent it from being damaged when the ſhip was firſt launched into the water, or afterwards ſtruck on any rocks; theſe were called χηλεύματα, in Latin *cunei*.

Next to the keel was φαλὸς the "pump-well, or well-room," within which was contained the ἀντλιον, or "pump," through which water was conveyed out of the ſhip.

After this, there was δευτερὼ τρόπις, or the "ſecond keel," ſomewhat reſembling what is now called *kelſon*; it was placed beneath the pump, and called λεσβιον, χαλκῆνε κλειτοποδιον; by ſome it is falſely ſuppoſed to be the ſame with φαλὸς.

Above the pump was an hollow place, called by Herodotus κοιλη της νηος, by Pollux κοτος and γαστρα, becauſe large and capacious, after the form of a belly; by the Latins *teſtudo*. This was formed by crooked ribs, with which it was ſurrounded, which were pieces of wood riſing from the keel upwards, and called by Heſychius

νομεις

History. νομεις, and by others εγκοιλια, the belly of the ſhip being contained within them: in Latin, *coſtæ*; and in Engliſh, *timbers*. Upon theſe were placed certain planks, which Ariſtophanes calls εντερωνιας, or εντερωνιδα.

The πλευραι, *latera*, or "ſides" of the ſhip, encompaſſed all the former parts on both hands; theſe were compoſed of large rafters extended from prow to ſtern, and called ζωστηρες, and ζωμιαματα, becauſe by them the whole fabric was begirt or ſurrounded.

In both theſe ſides the rowers had their places, called τοιχοι and ſδωλια, in Latin *fori* and *tranſtra*, placed above one another; the loweſt was called θαλαμος, and thoſe that laboured therein θαλαμιοι; the middle, ζολα, and the men ζυλιοι; the uppermoſt θρανοι, whence the rowers were termed θρανιται. In theſe apartments were ſpaces through which the rowers put their oars: theſe were ſometimes one continued vacuity from one end to the other, called τραφηξ, but more uſually diſtinct holes, each of which was deſigned for a ſingle oar; theſe were ſtyled τρημαλα, τρυπηματα, as alſo οφθαλμοι, becauſe not unlike the eyes of living creatures. All of them were by a more general name termed εγκωπα, from containing the oars; but εγκωπιν ſeems to have been another thing, ſignifying the ſpaces between the banks of oars on each ſide, where the paſſengers appear to have been placed. On the top of all there was a paſſage or place to walk, called ταραδος, and παραβαινος, as joining to the θρανοι, or uppermoſt bank of oars.

2. Πρωρα, the "prow, or fore deck," whence it is ſometimes called μετωπον, and commonly diſtinguiſhed by other metaphorical titles taken from human faces. In ſome ſhips there is mention of two prows, as alſo two ſterns; ſuch as Danaus's ſhip adorned by Minerva when he fled from Egypt. It was uſual to beautify the prow with gold and various ſorts of paint and colours; in the primitive times red was moſt in uſe; whence Homer's ſhips were generally dignified with the titles of μιλτοπαρηοι, and φοινικοπαρηοι, or "red faced;" the blue, likewiſe, or ſky-colour, was frequently made uſe of, as bearing a ſtrict reſemblance to the colour of the ſea; whence we find ſhips called by Homer κυανοπρωροι, by Ariſtophanes κυανεμβολοι. Several other colours were alſo made uſe of; nor were they barely varniſhed over with them, but very often annealed by wax melted in the fire, ſo that neither the ſun, winds, nor water, were able to deface them. The art of doing this was called from the wax κηρογραφια, from the fire εγκαυſικη, which is deſcribed by Vitruvius, and mentioned in Ovid.

———*Picta coloribus uſtis*
Cæruleam matrem concava puppis habet.

The painted ſhip with melted wax anneal'd
Had Tethys for its deity———

In theſe colours the various forms of gods, animals, plants, &c. were uſually drawn, which were likewiſe often added as ornaments to other parts of the ſhips, as plainly appears from the ancient monuments preſented to the world by Bayfius.

The ſides of the prow were termed πτερα, or "wings," and παρια, according to Scheffer, or rather παρειαι; for ſince the prow is commonly compared to a human face, it will naturally follow that the ſides ſhould be called *cheeks*. Theſe are now called *bows* by our mariners.

3. Πρυμνη, "the hind-deck or poop," ſometimes called ουρα, the "tail," becauſe the hindmoſt part of the ſhip; it was of a figure more inclining to round than the prow, the extremity of which was ſharp, that it might cut the waters; it was alſo built higher than the prow, and was the place where the pilot ſat to ſteer; the outer-bending part of it was called επωτιων, anſwering to our term *quarter*. History.

They had various ornaments of ſculpture on the prow; as helmets, animals, triumphal wreaths, &c.—The ſtern was more particularly adorned with wings, ſhields, &c. Sometimes a little maſt was erected whereon to hang ribbands of divers colours, which ſerved inſtead of a flag to diſtinguiſh the ſhip; and a weathercock, to ſignify the part from whence the wind blew.

On the extremity of the prow was placed a round piece of wood, called the πλυχις, from its bending; and ſometimes οφθαλμος, the "eye" of the ſhip, becauſe fixed in the fore-deck; on this was inſcribed the name of the ſhip, which was uſually taken from the figure painted on the flag. Hence comes the frequent mention of ſhips called *Pegaſi*, *Scyllæ*, *bulls*, *rams*, *tigers*, &c. which the poets took the liberty to repreſent as living creatures that tranſported their riders from one country to another.

The whole fabric being completed, it was fortified with pitch, and ſometimes a mixture of roſin, to ſecure the wood from the waters; whence it comes that Homer's ſhips are everywhere mentioned with the epithet of μελαιναι, or "black." Pitch was firſt uſed by the inhabitants of Phæacia, ſince called Corfica; ſometimes wax was employed for the ſame purpoſe; whence Ovid,

Cærulea ceratas accipit unda rates.

The azure waves receive the waxed ſhips.

After all, the ſhip being bedecked with garlands and flowers, the mariners alſo adorned with crowns, ſhe was launched into the ſea with loud acclamations and other expreſſions of joy; and being purified by a prieſt with a lighted torch, an egg and brimſtone, or after ſome other manner, was conſecrated to the god whoſe image ſhe bore.

The ſhips of war of the ancients were diſtinguiſhed from other kinds of veſſels by various turrets and acceſſions of building, ſome to defend their own ſoldiers, and others to annoy the enemy; and from one another, in latter ages, by ſeveral degrees or ranks of oars, the moſt uſual number of which was four or five, which appear not to have been arranged, as ſome imagine, on the ſame level in different parts of the ſhip; nor yet, as others have ſuppoſed, directly above one another's heads; but their ſeats being placed one behind another, aſcended gradually, like ſtairs. Ptolemy Philopater, urged by a vain-glorious deſire of exceeding all the world beſides in naval architecture, is ſaid to have farther enlarged the number of banks to 40; and the ſhip being otherwiſe in equal proportion, this raiſed her to ſuch an enormous bulk, that ſhe appeared at a diſtance like a floating mountain or iſland; and, upon a nearer view, like a prodigious caſtle on the ocean. She was 280 cubits long, 38 broad, and 48 high (each cubit being 1 Engliſh foot 5⅓ inches), and carried 400 rowers, 400 ſailors, and 3000 ſoldiers. Another which the

ſame

History. fame prince made to ſail on the Nile, we are told, was half a ſtadium long. Yet theſe were nothing in compariſon of Hiero's ſhip, built under the direction of Archimedes; on the ſtructure of which Moſchion wrote a whole volume. There was wood enough employed in it to make 50 galleys; it had all the variety of apartments of a palace; ſuch as banqueting-rooms, galleries, gardens, fiſh-ponds, ſtables, mills, baths, and a temple to Venus. The floors of the middle apartment were all inlaid, and repreſented in various colours the ſtories of Homer's Iliad. The ceilings, windows, and all other parts, were finiſhed with wonderful art, and embelliſhed with all kinds of ornaments. In the uppermoſt apartment there was a ſpacious gymnaſium, or place for exerciſe, and water was conveyed to the garden by pipes, ſome of hardened clay, and others of lead. The floors of the temple of Venus were inlaid with agates and other precious ſtones; the inſide lined with cypreſs wood; the windows adorned with ivory paintings and ſmall ſtatues. There was likewiſe a library. This veſſel was adorned on all ſides with fine paintings. It had 20 benches of oars, and was encompaſſed with an iron rampart, eight towers, with walls and bulwarks, furniſhed with machines of war, particularly one which threw a ſtone of 300 pounds, or a dart 12 cubits long, the ſpace of half a mile, with many other particulars related by Athenæus. Caligula likewiſe built a veſſel adorned with jewels in the poop, with ſails of many colours, and furniſhed with large porticoes, bagnios, and banqueting-rooms, beſides rows of vines, and fruit-trees of various kinds. But theſe, and all ſuch monſtrous fabrics, ſerved only for ſhow and oſtentation, being rendered by their vaſt bulk unwieldy and unfit for ſervice. Athenæus informs us, the common names they were known by, were *Cyclades*, or *Ætna*, i. e. "iſlands, or mountains," to which they ſeemed nearly equal in bigneſs; conſiſting, as ſome report, of as many materials as would have compoſed 50 triremes, or ſhips of three banks.

The veſſels employed by the northern nations appear to have been ſtill more imperfect than thoſe of the Romans; for a law was enacted in the reign of the emperor Honorius, 24th September, A. D. 418, inflicting capital puniſhment on any who ſhould inſtruct the barbarians in the art of ſhip-building; a proof at once of the great eſtimation in which this ſcience was then held, and of the ignorance of the barbarians with regard to it.

The fleet of Richard I. of England, when he weighed anchor for the holy war from Meſſina, in Sicily, where he had paſſed the winter, A. D. 1190-1, is ſaid to have conſiſted of 150 great ſhips and 53 galleys, beſides barks, tartans, &c. What kinds of ſhips theſe were is not mentioned. To the cruſades, however pernicious in other reſpects, this ſcience ſeems to owe ſome improvements; and to this particular one we are indebted for Richard's marine code, commonly called the *Laws of Oleron*, from the name of a ſmall iſland on the coaſt of France, where he compoſed them, and which moſt of the nations in Europe have made the baſis of their maritime regulations. Thoſe ſhips, if they merited the name of ſhips, were probably very ſmall, as we find that ſo long after as the time of Edward I. anno 1304, 40 men were deemed ſufficient to man the beſt and largeſt veſſels in England; and that Edward the Third, anno 1335, ordained the mayor and ſheriffs of London to "take up all ſhips in their port, and all other ports in the kingdom, of the burden of 40 tons and upwards, and to furniſh the ſame with armed men and other neceſſaries of war, againſt the Scots his enemies, confederated with certain perſons of foreign nations." Edward the Third's fleet before Calais, anno 1347, conſiſted of 738 Engliſh ſhips, carrying 14,956 mariners, being on an average but 20 men to each ſhip; 15 ſhips and 459 mariners, from Bayonne in Guienne, being 30 men to each ſhip; 7 ſhips and 184 men from Spain, which is 26 men to each ſhip; one from Ireland, carrying 25 men; 14 from Flanders, with 133 men, being ſcarcely 10 men to each ſhip: and one from Guelderland, with 24 mariners. Fifteen of theſe were called the king's own ſhips, manned with 419 mariners, being ſomewhat under 17 to each ſhip. History.

Hiſtorians repreſent the veſſels of Venice and Genoa as the largeſt and the beſt about this time, but they were ſoon exceeded in ſize by the Spaniſh veſſels called *carricks*, ſome of which carried cannon; and theſe again were exceeded by the veſſels built by the northern people, particularly thoſe belonging to the Hanſe-towns.—In the 14th century, the Hanſeatics were the ſovereigns of the northern ſeas, as well without as within the Baltic; and their ſhips were ſo large, that foreign princes often hired them in their wars. According to Hakluyt, an Engliſh ſhip from Newcaſtle, of 200 tons burden, was ſeized in the Baltic by thoſe of Wiſmar and Roſtock, anno 1394; and another Engliſh veſſel of the ſame burden was violently ſeized in the port of Liſbon, anno 1412. *Fœdera*, vol. viii. p. 727.

Soon after ſhips of a much larger ſize were conſtructed. It is mentioned that a very large ſhip was built, anno 1449, by John Taverner of Hull; and in the year 1455, King Henry IV. at the requeſt of Charles king of Sweden, granted a licence for a Swediſh ſhip of the burden of a thouſand tons or under, laden with merchandize, and having 120 perſons on board, to come to the ports of England, there to diſpoſe of their lading, and to relade back with Engliſh merchandize, paying the uſual cuſtoms. The inſcription on the tomb of William Canning, an eminent merchant, who had been five times mayor of Briſtol, in Ratcliff-church at Briſtol, anno 1474, mentions his having forfeited the king's peace, for which he was condemned to pay 300 merks; in lieu of which ſum, King Edward IV. took of him 2470 tons of ſhipping, amongſt which there was one ſhip of 900 tons burden, another of 500 tons, and one of 400 tons, the reſt being ſmaller. *Ib.* vol. xi. p. 258. *Ib.* vol. xi. p. 364.

In the year 1506, King James IV. of Scotland built the largeſt ſhip which had hitherto been ſeen, but which was loſt in her way to France in the year 1512, owing probably to a defective conſtruction, and the unſkilfulneſs of the crew in managing ſo large a ſhip.—About this time a very large ſhip was likewiſe built in France. In the fleet fitted out by Henry VIII. anno 1512, there was one ſhip, the Regent, of 1000 tons burden, one of 500, and three of 400 each. A ſhip ſtill larger than the Regent was built ſoon after, called *Henri Grace Dieu!* In the year 1522 the firſt voyage round the globe was finiſhed.

The Engliſh naval hiſtorians think that ſhips carried cannon on their upper decks only, and had no gun-ports before the year 1545: and it is certain that many

Fœdera, vol. ii. p. 943.

Ib. vol. iv. p. 664.

History. of the largeſt ſhips in former times were fitted out from harbours, where ſhips of a moderate ſize now would not have water enough to float them. In 1575 the whole of the royal navy did not exceed 24 ſhips, and the number of merchant-ſhips belonging to England amounted to no more than 135 veſſels above 100 tons, and 656 between 40 and 100 tons. At Queen Elizabeth's death, anno 1603, there were not above four merchant-ſhips in England of 400 tons burden each.—The largeſt of Queen Elizabeth's ſhips of war was 1000 tons burden, carrying but 340 men, and 40 guns, and the ſmalleſt 600 tons, carrying 150 men and 30 guns. Smaller veſſels were occaſionally hired by her from private owners.

Morſon's Naval Tracts, p. 294.

In the memorable ſea-fight of Lepanto between the Turks and Chriſtians, anno 1571, no veſſels were employed but galleys; and it would appear from the carcaſes of ſome of them, which are ſtill preſerved in the arſenal at Venice, that even theſe were not ſo large or ſo well conſtructed as thoſe of our times. The Invincible Armada, as Spaniſh vanity ſtyled it, once the terror and admiration of nations, in the pompous and exaggerated deſcriptions of which the Spaniſh authors of thoſe times dwelt with ſo much apparent pleaſure, conſiſted of 130 ſhips, near 100 of which were the ſtateſieſt that had yet been ſeen on the ocean. The largeſt of theſe, however, would be no more than a third rate veſſel in our navy, and they were ſo ill conſtructed, that they would neither move eaſily, ſail near the wind, nor be properly worked in tempeſtuous weather. The whole of the naval force collected by Queen Elizabeth to oppoſe this formidable fleet, including hired veſſels, tenders, ſtore-ſhips, &c. amounted to no more than 143.

Ship-building began now to make a conſiderable progreſs in Britain. Both war and trade required an increaſe of ſhipping; ſo that, in the year 1670, the annual charge of the navy was reported to be 500,000l.; and in 1678 the navy conſiſted of 83 ſhips, of which 58 were of the line. At this time the exports amounted to ten millions per annum; and the balance of trade was two millions. In 1689 there were 173 ſhips, great and ſmall, in the royal navy, and it has been conſtantly increaſing; ſo that in 1761 the ſhips in the navy amounted to 372, of which 129 were of the line; and in the beginning of the year 1795, the total amount was above 430.

3 Ships of the common form found defective,

As ſhips of the common conſtruction are found to be very defective in many particulars, various methods have therefore from time to time been propoſed to remove ſome of the bad qualities they poſſeſſed. As it would be an endleſs taſk to enumerate the different inventions for this purpoſe, a few of them only will now be mentioned.

4 and improvements propoſed.

5 Double ſhips introduced by Sir William Petty, *European Magazine* for Auguſt 1782.

In 1663 Sir William Petty conſtructed a double ſhip, or rather a ſingle ſhip with a double bottom, which was found to ſail conſiderably faſter than any of the ſhips with which it had an opportunity of being tried. Her firſt voyage was from Dublin to Holyhead; and in her return "ſhe turned into that narrow harbour againſt wind and tide, among rocks and ſhips, with ſuch dexterity as many ancient ſeamen confeſſed they had never ſeen the like." This veſſel with 70 more was loſt in a dreadful tempeſt. History.

6 and again propoſed by Mr Gordon, p. 54.

This ſubject was again revived by Mr Gordon, in his Principles of Naval Architecture, printed at Aberdeen anno 1784; where, having delivered his ſentiments on the conſtruction of large maſts, he ſays: "Theſe experiments likewiſe point out to us methods by which two veſſels may be laterally connected together, though at a conſiderable diſtance from each other, in a manner ſufficiently ſtrong, with very little increaſe of weight or expence of materials, and without expoſing much ſurface to the action or influence of the wind or the waves, or obſtructing their motion in any conſiderable degree, and conſequently without being much oppoſed by them on that account under any circumſtances; and if veſſels are judiciouſly conſtructed with a view to ſuch a junction, it would be no eaſy matter to enumerate all the advantages that may be obtained by this means." He then enumerates the advantages that double veſſels would have over thoſe of the common conſtruction. Soon after double ſhips were actually built by Mr Miller of Dalſwinton.

7 And lately conſtructed by Mr Miller.

Principles of Naval Architecture, p. 76.

Another plan was propoſed by Mr Gordon to make a ſhip ſail faſt, draw little water, and to keep a good wind. For this purpoſe, "the bottom (he ſays) ſhould be formed quite flat, and the ſides made to riſe perpendicular from it, without any curvature; which would not only render her more ſteady, as being more oppoſed to the water in rolling, but likewiſe more convenient for ſtowage, &c. while the ſimplicity of the form would contribute greatly to the eaſe and expedition with which ſhe might be fabricated. Though diminiſhing the draught of water is, *cæteris paribus*, undoubtedly the moſt effectual method of augmenting the velocity with which veſſels go before the wind; yet, as it proportionally diminiſhes their hold of the water, it renders them extremely liable to be driven to leeward, and altogether incapable of keeping a good wind. This defect may, however, be remedied, in a ſimple and effectual manner, by proportionally augmenting the depth of keel, or, as ſo large a keel would be inconvenient on many accounts, proportionally increaſing their number; as, in place of adding a keel eight feet deep to a veſſel drawing ſix feet water, to affix to different parts of her flat bottom, which would be well adapted for receiving them, ſix different keels of two feet deep each at equal diſtances from each other, with proper intervals between; which will be found equally effectual for preventing theſe pernicious effects. Four ſuch, indeed, would have anſwered the purpoſe as well as the eight feet keel, were it not for the ſuperior preſſure or reſiſtance of the lower water (A).

8 Draught of water propoſed to be diminiſhed in order to obtain velocity, &c.

9 Inconveniency of this plan.

10 Remedied by augmenting the depth of the keel,

11 or by increaſing the number of keels.

Thus

(A) This is frequently repeated on the authority of Mr Gordon and others. Theory ſays otherwiſe; and the experiments of Sir Iſaac Newton ſhow in the moſt unexceptionable manner, that the reſiſtance of a ball deſcending through the water is the ſame at all depths; nay, the heaping up of the water on the bow, occaſioning a hydroſtatical preſſure in addition to the real reſiſtance, will make the whole oppoſition to an equal ſurface, but of greater horizontal dimenſions, greater, becauſe it bears a greater proportion to the reſiſtance.

History. Thus then it appears, that a veſſel drawing eight feet water only, keels and all, may be made to keep as good a wind, or be as little liable to be driven to leeward, as the ſharpeſt built veſſel of the ſame length drawing 14, nay 20 or upwards, if a few more keels are added, at the ſame time that ſhe would be little more reſiſted in moving in the line of the keels than a veſſel drawing ſix feet water only. Theſe keels, beſides, would ſtrengthen the veſſel conſiderably, would render her more ſteady, and leſs liable to be overſet, and thereby enable her to carry more ſail; and Mr Gordon then enumerates the ſeveral advantages that a ſhip of this conſtruction will poſſeſs.

12 The plan farther improved by the adoption of ſliding keels. This plan has been put into execution by Captain Schank, with this difference only, that inſtead of the keels being fixed as propoſed by Mr Gordon, Captain Schank conſtructed them ſo as to ſlide down to a certain depth below the bottom, or to be drawn up within the ſhip as occaſion might require.

13 The utility of ſliding keels proved by experiment. Captain Schank having communicated his plans to the Navy Board, two veſſels were in conſequence ordered to be built of 13 tons each, and ſimilar in dimenſions, one on the old conſtruction, and the other flat-bottomed, with ſliding keels. In 1790 a comparative trial in preſence of the commiſſioners of the navy was made on the river Thames, each having the ſame quantity of ſail; and although the veſſel on the old conſtruction had leeboards, a greater quantity of ballaſt, and two Thames pilots aboard, yet Captain Schank's veſſel with three ſliding keels beat the other veſſel, to the aſtoniſhment of all preſent, one half of the whole diſtance ſailed; and no doubt ſhe would have beat her much more had ſhe been furniſhed with a Thames pilot.

14 And actually put in practice upon a larger ſcale. This trial gave ſo much ſatisfaction, that a king's cutter of 120 tons was immediately ordered to be built on the ſame conſtruction, and Captain Schank was requeſted to ſuperintend its building. This veſſel was launched at Plymouth in 1791, and named the *Trial*. The length of this veſſel is 66 feet, breadth 21 feet, and depth of the hold ſeven feet: her bottom is quite flat, and draws only ſix feet water, with all her guns, ſtores, &c. whereas all other veſſels of her tonnage on the old conſtruction draw 14 feet; ſo that ſhe can go with ſafety into almoſt any harbour or creek. She has three ſliding keels incloſed in a caſe or well; they are each 14 feet in length; the fore and the after keels are three feet broad each, and the middle keel is ſix feet broad. The keels are moveable by means of a winch, and may be let down ſeven feet below the real keel; and they work equally well in a ſtorm as in ſtill water. Her hold is divided into ſeveral compartments, all water-tight, and ſo contrived, that ſhould even a plank or two ſtart at ſea in different parts of the veſſel, ſhe may be navigated with the greateſt ſecurity to any place. If ſhe ſhould be driven on ſhore in a gale of wind, ſhe will not ſoon become a wreck, as her keels will be driven up into their caſes, and the ſhip being flat-bottomed, will not be eaſily overſet; and being able to go into ſuch ſhallow water, the crew may all be eaſily ſaved. By means of her ſliding keel ſhe is kept ſteady in the greateſt gale; ſhe is quite eaſy in a great ſea, does not ſtrain in the leaſt, and never takes in water on her deck; and when at anchor, ſhe rides more upright and even than any other ſhip can do: ſhe ſails very faſt either before or upon a wind; no veſſel ſhe has ever been in company with, of equal ſize, has been able, upon many trials, to beat her in ſailing; and yet her ſails ſeem too ſmall. History.

It has alſo been propoſed to conſtruct veſſels of other materials than wood; and a veſſel was built whoſe bottom, inſtead of being plank, was copper.

Book I. *Containing the Method of Delineating the ſeveral Sections of a Ship.*

Chap. I. *Of the Properties of Ships.*

15 General principles of ſhip-building. A ship ought to be conſtructed ſo as to anſwer the particular purpoſe for which ſhe is intended. It would be an eaſy matter to determine the form of a ſhip intended to ſail by means of oars; but, when ſails are uſed, a ſhip is then acted upon by two elements, the wind and water: and therefore it is much more difficult than is commonly imagined to aſcertain the form of a ſhip ſo as to anſwer in an unfavourable as well as a favourable wind; the ſhip at the ſame time having a cargo of a certain weight and magnitude.

16 Properties that a ſhip muſt poſſeſs to be a good ſailer. Every ſhip ought to ſail well, but particularly when the wind is upon the beam; for this purpoſe a conſiderable length in proportion to the breadth is neceſſary, and the plane of reſiſtance ſhould be the leaſt poſſible. The main frame ſhould alſo be placed in a proper ſituation; but according to the experiments of Mr Chapman *, its plane is variable with the velocity of the ſhip: the mean place of the main frame has, however, been generally eſtimated to be about one-twelfth of the length of the keel before the middle. Without a ſufficient degree of ſtability a ſhip will not be able to carry a preſs of ſail: a great breadth in proportion to the length and low upper-works will augment the ſtability. The following particulars being attended to, the above property will be gained, and the ſhip will alſo ſteer well. The wing tranſom ſhould be carried pretty high; the faſhion-pieces well formed, and not full below the load water-line: the lower part of the ſtem to be a portion of a circle, and to have a conſiderable rake: the ſternpoſt to be nearly perpendicular to the keel; and all the upper works kept as low as poſſible.

* *Traité de la Conſtruction des Vaiſſeaux*, p. 40.

17 To make a ſhip keep a good wind. Many ſhips from conſtruction are liable to make much leeway. This may in a great meaſure be avoided by giving the ſhip a long keel, little breadth, and a conſiderable depth in the hold: whence the bow will meet with little reſiſtance in compariſon to the ſide, and therefore the ſhip will not fall much to the leeward.

18 and to ſail ſmoothly without pitching hard. Another very great retardation to the velocity of a ſhip is her pitching. The principal remedy for this is to increaſe the length of the keel and floor, to diminiſh the riſing afore and abaft, and to conſtruct the hull in ſuch a manner that the contents of the fore-body may be duly proportioned to the contents of the after-body.

19 In ſhips of war the lower deck guns to be ſufficiently high above the water. In a ſhip of war the lower tier of guns ought to be of a ſufficient height above the water, otherwiſe it will be impoſſible to work the lee-guns when it blows hard. This property will be obtained by giving her a long floor-timber, little riſing, a full midſhip frame, light upper works, and the wing tranſom not too high: And in every ſhip the extreme breadth ought always to be higher afore and abaft than at midſhips.

Properties of Ships.

20 Properties of a merchant ſhip,

21 to take in a great cargo,

22 and to have ſtability.

A merchant ſhip, beſides being a faſt ſailer, ought to carry a conſiderable cargo in proportion to its length, to ſail with little ballaſt, and to be navigated with few hands.

That a ſhip may take in a conſiderable cargo, it ſhould have a great breadth and depth in proportion to its length, a full bottom, and a long and flat floor. But a ſhip of this conſtruction will neither ſail faſt, nor carry much ſail.

If a ſhip be filled out much towards the line of floatation, together with low upper works, ſhe will require little ballaſt: and that ſhip which is ſtiff from conſtruction is much better adapted for ſailing faſt than one which, in order to carry the ſame quantity of canvas, is obliged to be loaded with a much greater weight: for the reſiſtance is as the quantity of water to be removed, or nearly as the area of a tranſverſe ſection of the immerſed part of the body at the midſhip frame; and a body that is broad and ſhallow is much ſtiffer than one of the ſame capacity that is narrow and deep.

Principles of Naval Architecture, p. 100.

23 Advantages of a ſhip of a ſmall draught of water,

"The advantages (ſays Mr Gordon) are numerous, important, and obvious. For it is evident, that by enlarging, perhaps doubling, the breadth of veſſels, and forming their bottoms flat and well furniſhed with keels, they muſt, in the *firſt* place, become much ſteadier, roll little, if any, and be enabled to carry greatly more ſail, and that in a better direction, at the ſame time that they would be in no danger of being diſmaſted or overſet, unleſs the maſts were of a moſt extraordinary height indeed. *Secondly*, They would have little or no occaſion for ballaſt, and if any was uſed, could incur leſs danger from its ſhifting. *Thirdly*, That there would be much more room upon deck, as well as accommodation below; the breadth being ſo much increaſed without any diminution of the height above the load-water line. *Fourthly*, That they would deviate much leſs from the intended courſe, and penetrate the water much eaſier in the proper direction: for doubling the breadth, without any increaſe of weight, would diminiſh the depth or draught of water one half; and though the extent of the directly oppoſing ſurface would be the ſame as before, yet the veſſel in moving would meet with half the former reſiſtance only; for ſo great is the difference between the preſſure, force, or reaction, of the upper and the under water. *Fifthly*, That they would by this means be adapted for lying unſupported in docks and harbours when dry, be rendered capable of being navigated in ſhallow water, and of being benefited by all the advantages attending that very important circumſtance; and it is particularly to be obſerved, that making veſſels which may be navigated in ſhallow water, may, in many reſpects, juſtly be regarded as a matter of equal importance with increaſing the number of harbours, and improving them, as having identically the ſame effects with regard to navigation; at the ſame time, that the benefits which would reſult from ſuch circumſtances are obtained by this means without either expence, trouble, or inconvenience: beſides, it would not only enable veſſels to enter many rivers, bays, and creeks, formerly inacceſſible to ſhips of burden, but to proceed to ſuch places as are moſt landlocked, where they can lie or ride moſt ſecure, and with leaſt expence of men and ground tackle. As ſhips of war would carry their guns well by being ſo ſteady, there could be but little occaſion for a high topſide, or much height of hull above water; and as little or no ballaſt would be required, there would be no neceſſity, as in other veſſels, for increaſing their weight on that account, and thereby preſſing them deeper into the water. Theſe are very important circumſtances, and would contribute much to improve the ſailing of ſuch veſſels." From whence it appears, that there would be united, what has hitherto been deemed irreconcileable, the greateſt poſſible ſtability, which is nearly as the area of a tranverſe ſection of the immerſed part of the body at the midſhip frame: and a body that is broad and ſhallow is much ſtiffer than one of the ſame capacity that is narrow and deep. A ſhip of this conſtruction may take in a conſiderable cargo in proportion to her ſize; but if deeply loaded will not ſail faſt, for then the area of a ſection of the immerſed part at the midſhip frame will be very conſiderable; and as the ſails of ſuch a ſhip muſt neceſſarily be large, more hands will therefore be required.

Properties of Ships.

24 and to be navigated with few hands.

The leſs the breadth of a ſhip, the fewer hands will be neceſſary to work her; as in that caſe the quantity of ſail will be leſs, and the anchors alſo of leſs weight. We ſhall gain much (ſays M. Bouguer) by making the extreme breadth no more than the fifth or ſixth part of the length, if, at the ſame time, we diminiſh the depth proportionally; and likewiſe this moſt ſurpriſing circumſtance, that by diminiſhing theſe two dimenſions, or by increaſing the length, a ſhip may be made to go ſometimes as faſt as the wind.

Traité du Navire.

25 Impoſſible to unite all the qualities in the ſame ſhip.

In order to obtain the preceding properties, very oppoſite rules muſt be followed; and hence it appears to be impoſſible to conſtruct a ſhip ſo as to be poſſeſſed of them all. The body, however, muſt be ſo formed, that as many of theſe properties may be retained as poſſible, always obſerving to give the preference to thoſe which are moſt required. If it is known what particular trade the ſhip is to be employed in, thoſe qualities are then principally to be adhered to which are moſt eſſentially neceſſary for that employment.

26 Small ſhips inferior to large ones in point of ſailing, &c.

It may eaſily be demonſtrated that ſmall ſhips will not have the ſame advantages as large ones of a ſimilar form, when employed in the ſame trade: for a large ſhip will not only ſail faſter than a ſmall one of a ſimilar form, but will alſo require fewer hands to work her. Hence, in order that a ſmall ſhip may poſſeſs the ſame advantages as a large one, the correſponding dimenſions will not be proportional to each other. The reader will ſee in Chapman's *Architectura Navalis Mercatoria* ample tables of the ſeveral dimenſions of ſhips, of different claſſes and ſizes, deduced from theory combined with experiment. Tables of the dimenſions of the principal ſhips of the Britiſh navy, and of other ſhips, are contained in the Ship-builder's Repoſitory, and in Murray's Treatiſe on Ship-building.

CHAP. II. *Of the different Plans of a Ship.*

WHEN it is propoſed to build a ſhip, the proportional ſize of every part of her is to be laid down; from whence the form and dimenſions of the timbers, and of every particular piece of wood that enters into the conſtruction, is to be found. As a ſhip has length, breadth, and depth, three different plans at leaſt are neceſſary to exhibit

Different Plans of a Ship.

exhibit the form of the ſeveral parts of a ſhip: theſe are are uſually denominated the *ſheer plan*, the *half breadth* and *body plans*.

27 Sheer draught, or elevation.

The *ſheer plan* or *draught*, otherwiſe called the *plan of elevation*, is that ſection of the ſhip which is made by a vertical plane paſſing through the keel. Upon this plan are laid down the length of the keel; the height and rake of the ſtem and ſternpoſt; the ſituation and height of the midſhip and other frames; the place of the maſts and channels; the projection of the head and quarter gallery, and their appendages; and in a ſhip of war the poſition and dimenſions of the gun-ports. Several imaginary lines, namely, the upper and lower height of breadth lines, water lines, &c. are alſo drawn in this plane.

28 Half breadth plan or horizontal plane.

The *half breadth* or, *floor plan*, or, as it is frequently called the *horizontal* plane, contains the ſeveral half-breadths of every frame of timbers at different heights; ribbands, water lines, &c. are alſo deſcribed on this plane.

29 Body plan, or projection.

The *body* plan, or *plane of projection*, is a ſection of the ſhip at the midſhip frame or broadeſt place, perpendicular to the two former. The ſeveral breadths, and the particular form of every frame of timbers, are deſcribed on this plane. As the two ſides of a ſhip are ſimilar to each other, it is therefore unneceſſary to lay down both; hence the frames contained between the main frame and the ſtem are deſcribed on one ſide of the middle line, commonly on the right hand ſide, and the after frames are deſcribed on the other ſide of that line.

30 The various lines laid down on theſe plans.

Several lines are deſcribed on theſe planes, in order the more readily to aſſiſt in the formation of the timbers; the principal of which are the following:

The *top-timber line*, is a curve limiting the height of the ſhip at each timber.

The *top-timber half breadth line*, is a ſection of the ſhip at the height of the top-timber line, perpendicular to the plane of elevation.

The *height of breadth lines*, are two lines named the *upper* and *lower* heights of breadth. Theſe lines are deſcribed on the plane of elevation to determine the height of the broadeſt part of the ſhip at each timber; and being deſcribed in the body plan, limit the height and breadth of each frame at its broadeſt part.

Main half breadth, is a ſection of the ſhip at the broadeſt part, perpendicular to the ſheer plan, and repreſents the greateſt breadth at the outſide of every timber.

Water lines, are lines ſuppoſed to be deſcribed on the bottom of a ſhip when afloat by the ſurface of water; and the uppermoſt of theſe lines, or that deſcribed by the water on the ſhip's bottom when ſufficiently loaded, is called the *load water line*. According as the ſhip is lightened, ſhe will riſe higher out of the water; and hence new water lines will be formed. If ſhe be lightened in ſuch a manner that the keel may preſerve the ſame inclination to the ſurface of the water, theſe lines will be parallel to each other; and if they are parallel to the keel, they will be repreſented by ſtraight lines parallel to each other in the body plan; otherwiſe by curves. In the half breadth plan, theſe lines are curves limiting the half breadth of the ſhip at the height of the correſponding lines in the ſheer plan. In order to diſtinguiſh theſe lines, they are uſually drawn in green.

Ribband lines, are curves on a ſhip's bottom by the interſection of a plane inclined to the plane of elevation; and are denominated *diagonal* or *horizontal*, according as they are meaſured upon the diagonal, or in a direction perpendicular to the plane of elevation. Both theſe anſwer to the ſame curve on the ſhip's bottom, but give very different curves when deſcribed on the half breadth plan.

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31 Frames, compoſed of a floor timber, futtocks, and top timber.

Frames, are circular pieces of timber bolted together, and raiſed upon the keel at certain diſtances, and to which the planks are faſtened. A frame is compoſed of one floor-timber, two or three futtocks, and a top-timber on each ſide: which being united together, form a circular incloſure, and that which incloſes the greateſt ſpace is called the *midſhip* or *main* frame. The arms of the floor-timber of this frame form a very obtuſe angle; but in the other frames this angle decreaſes with the diſtance of the frame from midſhips. Thoſe floor-timbers which form very acute angles are called *crutches*. The length of the midſhip floor-timber is in general about half the length of the main frame.

2 Sweeps of the ſeveral parts of a frame.

A frame of timbers is commonly formed by arches of circles called *ſweeps*. There are generally five ſweeps: 1ſt, The *floor ſweep*; which is limited by a line in the body plan perpendicular to the plane of elevation, a little above the keel; and the height of this line above the keel at the midſhip frame is called the *dead riſing*. The upper part of this arch forms the head of the floor timber. 2d, The *lower breadth ſweep*; the centre of which is in the line repreſenting the lower height of breadth. 3d, The *reconciling ſweep*. This ſweep joins the two former, without interſecting either; and makes a fair curve from the lower height of breadth to the riſing line. If a ſtraight line is drawn from the upper edge of the keel to touch the back of the floor ſweep, the form of the midſhip frame below the lower height of breadth will be obtained. 4th, The *upper breadth ſweep*; the centre of which is in the line repreſenting the upper height of breadth of the timber. This ſweep deſcribed upwards forms the lower part of the top timber. 5th, The *top timber ſweep* is that which forms the hollow of the top timber. This hollow is, however, very often formed by a mould, ſo placed as to touch the upper breadth ſweep, and paſs through the point limiting the half breadth of the top timber.

33 Names of frames.

The main frame, or as it is uſually called *dead-flat*, is denoted by the character ⊕. The timbers before dead-flat are marked A, B, C, &c. in order; and thoſe abaft dead-flat by the figures 1, 2, 3, &c. The timbers adjacent to dead-flat, and of the ſame dimenſions nearly, are diſtinguiſhed by the characters (A), (B), &c. and (1), (2), &c. That part of the ſhip abaft the main frame is called the *after body*; and that before it the *fore body*.

All timbers are perpendicular to the half breadth plan. Thoſe timbers whoſe planes are perpendicular to the ſheer plan, are called *ſquare timbers*; and thoſe whoſe planes are inclined to it are called *canted timbers*.

The *riſing line*, is a curve drawn in the ſheer plan, at the heights of the centres of the floor ſweeps in the body plan. As, however, this line, if drawn in this manner, would extend beyond the upper line of the figure, it is therefore uſually ſo drawn that its lower part may touch the upper edge of the keel. This is performed by taking the heights of each of the centres in the

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the body plan, from the height of the centre of the ſweep of dead-flat, and ſetting them off on the correſponding timbers in the ſheer plan from the upper edge of the keel.

Half breadth of the riſing, is a curve in the floor plan, which limits the diſtances of the centres of the floor ſweeps from the middle line of the body plan.

The riſing of the floor, is a curve drawn in the ſheer plan, at the height of the ends of the floor timbers. It is limited at the main frame or dead flat by the dead riſing, and in flat ſhips is nearly parallel to the keel for ſome timbers afore and abaft the midſhip frame; for which reaſon theſe timbers are called *flats*: but in ſharp ſhips it riſes gradually from the main frame, and ends on the ſtem and poſt.

Cutting-down line, is a curve drawn on the plane of elevation. It limits the depth of every floor timber at the middle line, and alſo the height of the upper part of the dead wood afore and abaft.

Timber and room, or *room and ſpace*, is the diſtance between the moulding edges of two timbers, which muſt always contain the breadth of two timbers and an interval of about two or three inches between them. In forming the timbers, one mould ſerves for two, the foreſide of the one being ſuppoſed to unite with the aftſide of the other, and ſo make only one line, which is called the *joint of the timbers*.

34 Principal pieces that compoſe a ſhip. Plate cccclxxxiv. Fig. 1.

In order to illuſtrate the above, and to explain more particularly the principal pieces that compoſe a ſhip, it will be neceſſary to give a deſcription of them. Theſe pieces are for the moſt part repreſented according to the order of their diſpoſition in fig. 1.

A, Repreſents the pieces of the keel to be ſecurely bolted together and clinched.

B, the ſternpoſt, which is tenanted into the keel, and connected to it by the knee G.

E, The back of the poſt, which is alſo tenanted into the keel, and ſecurely bolted to the poſt; the intention of it is to give ſufficient breadth to the port, which ſeldom can be got broad enough in one piece. C is the falſe poſt, which is fayed (B) to the fore part of the ſternpoſt.

C, The ſtem, in two pieces, to be ſcarfed together. The ſtem is joined to the fore foot, which makes a part of both.

H, The apron, in two pieces, to be ſcarfed together, and fayed on the inſide of the ſtem, to ſupport the ſcarf thereof; and therefore the ſcarf of the apron muſt be at ſome diſtance from that of the ſtem.

I, The ſtemſon, in two pieces, to ſupport the ſcarf of the apron.

D, The beams which ſupport the decks; and F the knees by which the beams are faſtened to the ſides of the ſhip.

K, The wing tranſom: it is fayed acroſs the ſternpoſt, and bolted to the head of it, and its extremities are faſtened to the faſhion pieces. L, Is the deck tranſom, parallel to the wing tranſom. M, N, Two of the lower tranſoms: theſe are faſtened to the ſternpoſt and faſhion pieces in the ſame manner as the wing tranſom. Q, The knee which faſtens the tranſom to the ſhip's ſide. And, O, The faſhion piece, of which there is one on each ſide. The keel of the faſhion piece is connected with the dead-wood, and the head is faſtened to the wing tranſom. Different Plans of a Ship.

R, S, Breaſt-hooks: theſe are fayed in the inſide to the ſtem, and to the bow on each ſide of it, to which they are faſtened with proper bolts. There are generally four or five in the hold, in the form of that marked R, and one in the form of that marked S, into which the lower deck planks are rabbeted: There is alſo one immediately under the hauſe holes, and another under the ſecond deck.

T, The rudder, which is joined to the ſternpoſt by the rudder irons, upon which it turns round in the googings, faſtened to the ſternpoſt for that purpoſe. There is a mortiſe cut in the head of the rudder, into which a long bar is fitted called the *tiller*, and by which the rudder is turned.

U, A floor timber: it is laid acroſs the keel, to which it it faſtened by a bolt through the middle. V, V, V, V, The lower, the ſecond, third, and fourth futtocks. W, W, The top timbers. Theſe repreſent the length and ſcarf of the ſeveral timbers in the midſhip frame.

X, The pieces which compoſe the kelſon. They are ſcarfed together in the ſame manner as the keel, and placed over the middle of the floor timbers, being ſcored about an inch and a half down upon each ſide of them, as repreſented in the figure.

Y, The ſeveral pieces of the knee of the head; the lower part of which is fayed to the ſtem, and its keel is ſcarfed to the head of the forefoot. It is faſtened to the bow by two knees, called *cheeks*, in the form of that repreſented by Z; and to the ſtem, by a knee called a *ſtandard*, in the form of that marked ⊕.

a, The cathead, of which there is one on each ſide of the bow, projecting ſo far as to keep the anchor clear of the ſhip when it is hove up.

b, The bits, to which the cable is faſtened when the ſhip is at anchor.

d, The ſide counter-timbers, which terminate the ſhip abaft within the quarter gallery.

e, *e*, Two pieces of dead wood, one afore and the other abaft, fayed on the keel.

Fig. 2. is a perſpective repreſentation of a ſhip framed and ready for the planking; in which A, A is the keel; B, the ſternpoſt; C, the ſtem; K, L, M, the tranſoms; F, F, F, F, F, F, the ribbands. Fig. 2.

CHAP. III. *Containing Preliminary Problems*, &c.

THE general dimenſions of a ſhip are the *length*, *breadth*, and *depth*.

35 Proportional dimenſions of a ſhip to be inferred from theory combined with practice;

To aſcertain thoſe dimenſions that will beſt anſwer the intended purpoſe is, no doubt, a problem of conſiderable difficulty; and, from theory, it may be ſhown that there are no determinate proportions ſubſiſting between the length, breadth, and depth, by which theſe dimenſions may be ſettled; yet, by combining theory and practice, the proportional dimenſions may be approximated to pretty nearly.

As

(B) To *fay*, is to join two pieces of timber cloſe together.

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As ſhips are conſtructed for a variety of different purpoſes, their principal dimenſions muſt therefore be altered accordingly, in order to adapt them as nearly as poſſible to the propoſed intention; but ſince there is no fixed ſtandard whereby to regulate theſe dimenſions, the methods therefore introduced are numerous, and in a great meaſure depend upon cuſtom and fancy.

37 and alſo from the circle.

With regard, however, to the proportional dimenſions, they perhaps may be inferred from the circle. Thus, if the extreme breadth be made equal to the diameter, the length at the load water line, or the diſtance between the rabbets of the ſtem and poſt at that place, may be made equal to the circumference of the ſame circle; and the depth of the hold equal to the radius, the upper works being continued upwards according to circumſtances. A ſhip formed from theſe dimenſions, with a bottom more or leſs full according as may be judged neceſſary, will no doubt anſwer the propoſed intention. Nevertheleſs, one or other of theſe dimenſions may be varied in order to gain ſome eſſential property, which the trade that the veſſel is intended for may require.

* *Practical Seaman-ſhip*, page 25.

The following hints are given by Mr Hutchinſon * towards fixing rules for the beſt conſtruction of ſhips bottoms.

† See Book ii. chap. 2.

1. "I would recommend (ſays he), to prevent ſhips bottoms from hogging † upwards amidſhip, to have the fore and after part of their keels deep enough, that the upper part may be made to admit a rabbet for the garboard ſtreak, that the main body and bearing part of the ſhips bottoms may be made to form an arch downwards in their length, ſuppoſe with the ſame ſheer as their bends, at the rate of about 2 inches for every 30 feet of the extreme length of the keel towards the midſhip or main frame, which may be reckoned the crown of the arch; and the lower part of the keel to be made ſtraight, but laid upon blocks ſo that it may form a regular convex curve downwards at the rate of an inch for every 30 feet of the extreme length of the keel, the loweſt part exactly under the main frame; which curve, I reckon, is only a ſufficient allowance for the keel to become ſtraight below, after they are launched afloat, by the preſſure of the water upward againſt their floors amidſhip, which cauſes their tendency to hog. And certainly a ſtraight keel is a great advantage in ſailing, as well as to ſupport them when laid upon level ground or on ſtraight blocks in a repairing dock, without taking damage.

2. "As ſquare ſterned ſhips, from experience, are found to anſwer all trades and purpoſes better than round or pink ſterned ſhips, I would recommend the fore part of the ſternpoſt, on account of drawing the water lines in the draught, only to have a few inches rake, that the after part may ſtand quite upright perpendicular to the keel: and for the rake of the ſtem I would propoſe the rabbet for the hudding ends for the entrance, and bows from the keel upwards, to form the ſame curve as the water line from the ſtem at the harpin towards the main breadth, and the bows at the harpin to be formed by a ſweep of a circle of half the three-fourths of the main breadth; and the main tranſom to be three-fourths of the main-breadth; and the buttocks, at the load or ſailing mark aft, to be formed, in the ſame manner as the bows at the harpin, with a ſweep of a circle of half the three fourths of the main breadth, to extend juſt as far from the ſtem and ſtern poſt as to admit a regular convex curve to the main frame, and from theſe down to the keel to form regular convex water-lines, without any of thoſe unnatural, hollow, concave ones, either in the entrance or run; which rules, in my opinion, will agree with the main body of the ſhip, whether ſhe is deſigned to be built full for burden or ſharp below for ſailing.

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3. "This rule for raking the ſtem will admit all the water-lines in the ſhip's entrance to form convex curves all the way from the ſtem to the midſhip or main frame, which anſwers much better for ſailing as well as making a ſhip more eaſy and lively in bad weather. And the bows ſhould flange off, rounding in a circular form from the bends up to the gunwale, in order to meet the main breadth the ſooner, with a ſweep of half the main breadth at the gunwale amidſhips; which will not only prevent them greatly from being plunged under water in bad weather, but ſpread the ſtanding fore-rigging the more, to ſupport theſe material maſts and ſails forward to much greater advantage than in thoſe over ſharp bowed ſhips, as has been mentioned. And as the ſailing trim of ſhips in general is more or leſs by the ſtern, this makes the water lines of the entrance in proportion the ſharper to divide the particles of water the eaſier, ſo that the ſhip may preſs through it with the leaſt reſiſtance.

4. "The run ought to be formed ſhorter or longer, fuller or ſharper, in proportion to the entrance and main body, as the ſhip is deſigned for burden or ſailing faſt. The convex curves of the water lines ſhould leſſen gradually from the load or ſailing mark aft, as has been mentioned, downwards, till a fair ſtraight taper is formed from the after part of the floor to the ſternpoſt below, without any concavity in the water lines; which will not only add buoyancy and burden to the after body and run of the ſhip, but, in my opinion, will help both her ſailing and ſteering motions; for the preſſure of the water, as it cloſes and riſes upon it to come to its level again, and fill up that hollow which is made by the fore and main body being preſſed forward with ſail, will impinge, and act with more power to help the ſhip forward in her progreſſive motion, than upon thoſe unnatural concave runs, which have ſo much more flat dead wood, that muſt, in proportion, be a hinderance to the ſtern being turned ſo eaſily by the power of the helm to ſteer the ſhip to the greateſt advantage."

Many and various are the methods which are employed to deſcribe the ſeveral parts of a ſhip. In the following problems, however, thoſe methods only are given which appear to be moſt eaſily applied to practice, and which, at the ſame time, will anſwer any propoſed purpoſe.

PROBLEM I. To deſcribe in the plane of elevation the ſheer or curvature of the top timbers.

Let QR (fig 3.) be the length of the ſhip between the wing tranſom and the rabbet of the ſtem. Then ſince it is generally agreed, eſpecially by the French conſtructors, that the broadeſt part of the ſhip ought to be about one-twelfth of the length before the main frame or dead flat; therefore make R⊕ equal to five-twelfths of QR, and ⊕ will be the ſtation of the main frame; ſpace the other frames on the keel, and from theſe points let perpendiculars be drawn to the keel. Let ⊕P be the height of the ſhip at the main frame,

Plate cccclxxxv. Fig. 3.

38 The place of the main frame about one-twelfth before the middle of the ſhip.

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VF the height at the aftermoſt frame, and RK the height at the ſtem. Through P draw EPL parallel to the keel; deſcribe the quadrants PGI, PMN, the radius being P⊕; make PH equal to EF, and PO equal KL, and draw the parallels GH, OM: Divide GH ſimilar to ⊕C, and OM ſimilar to ⊕R. Through theſe points of diviſion draw lines perpendicular to EL, and the ſeveral portions of theſe perpendiculars contained between EL and the arch will be the riſings of the top-timber line above EL. A curve drawn through theſe points will form the top-timber line.

39 Method of deſcribing the top-timber line.

This line is more eaſily drawn by means of a curved or bent ruler, ſo placed that it may touch the three points F, P, and K.

40 The ſtem, Fig. 3.

PROB. II. To deſcribe the ſtem.

Let K (fig. 3.) be the upper part of the ſtem, through which draw KS parallel to the keel, and equal to twice KR: Through the termination of the wales on the ſtem draw TW parallel to QR. Then from the centre S, with the diſtance SK, deſcribe an arch: Take an extent equal to the neareſt diſtance between the parallels WT, QR; and find the point W, ſuch that one point of the compaſs being placed there, the other point will juſt touch the neareſt part of the above arch; and from this point as a centre deſcribe an arch until it meets the keel, and the ſtem will be formed.

41 and poſt. Fig. 3.

PROB. III. To deſcribe the ſternpoſt.

Set off QV (fig. 3.) for the rake of the poſt: draw VX perpendicular to the keel, and equal to the height of the wing tranſom, join QX, and it will repreſent the aft ſide of the poſt.

42 Main half breadth line. Fig. 4.

PROB. IV. To deſcribe the half breadth line.

Let MN (fig. 4.) be the given length: Make N⊕ equal to five-twelfths of MN; draw the line ⊕P perpendicular to MN, and equal to the propoſed extreme half breadth. Let ME be the round aft of the ſtern or wing tranſom; make EO perpendicular to MN, and equal to the given half breadth at the ſtern, which is generally between two-thirds and three-fourths of the main half breadth; and deſcribe the arch MO, the centre of which is in the middle line. Space the frames (A), A, B, &c. and (1), 1, 2, &c. From the centre ⊕, with the radius ⊕P, deſcribe the quadrant PRS; deſcribe alſo the quadrant PCT. Through the point O draw ORU parallel to MN; divide the ſtraight line RU ſimilar to M⊕; and through theſe points of diviſion draw lines perpendicular to MN, and meeting the arch. Transfer theſe lines to the correſpondent frames each to each, and a curve drawn through the extremities will repreſent that part of the ſide contained between the main frame and the ſtern. Again, through Q, the extremity of the foremoſt frame, draw QV parallel to MN. Or make PV a fourth or third part of PU, according as it is intended to make the ſhip more or leſs full towards the bow. Divide VC ſimilar to ⊕C; through theſe points draw lines perpendicular to MN, and terminating in the quadrantal arch: Transfer theſe lines to the correſponding timbers in the fore part, and a curve drawn through the extreme points will limit that part of the ſhip's ſide contained between P and Q. Continue the curve to the next timber at X. From Q draw QZ perpendicular to QX; make the angle ZNQ equal to ZQN, and the point Z will be the centre of the arch forming the bow. Remark, if it is propoſed that the breadth of the ſhip at the frames adjacent to the main frame ſhall be equal to the breadth at the main frame; in this caſe, the centres of the quadrantal arches will be at the points of interſection of theſe frames with the line MN; namely, at (A) and (1). Alſo, if the height of the ſhip at the frames (A) and (1) is to be the ſame as at dead flat, the quadrantal arches in fig. 3. are to be deſcribed from the points of interſection of theſe frames with the line EL.

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Theſe rules, it is evident, are variable at pleaſure; and any perſon acquainted with the firſt principles of mathematics may apply calculation to find the radii of the ſeveral ſweeps.

PROB. V. To deſcribe the main frame or dead flat.

43 Of the midſhip frame.

This frame is that which contains the greateſt ſpace, and the particular form of each of the other frames depends very much on it. If the ſhip is intended to carry a great burden in proportion to her principal dimenſions, this frame is made very full; but if ſhe is intended to ſail faſt, it is uſually made ſharp. Hence ariſes diverſity of opinions reſpecting its form; each conſtructor uſing that which to him appears preferable. In order to ſave repetition, it is judged proper to explain certain operations which neceſſarily enter into all the different methods of conſtructing this frame.

44 General precepts for deſcribing it. Fig. 5.

In the plane of the upper ſide of the keel produced, draw the line AB (fig. 5.) equal to the propoſed breadth of the ſhip; biſect AB in C, and draw AD, CE, and BF, perpendicular to AB. Then, ſince the two ſides of a ſhip are ſimilar, it is therefore thought ſufficient to deſcribe the half of each frame between the main frame and the ſtern on one ſide of the middle line CE, and the half of each of thoſe before the main frame on the other ſide of it. The firſt half is called the *after-body*, and the other the *fore-body*. The after-body is commonly deſcribed on the left ſide of the middle line; and the fore-body on the right ſide of it: hence the line AD is called the *ſide line* of the *after* body, and BF the ſide line of the *fore* body. Make AD and BF each equal to the height of the ſhip at the main frame. Make AG, BG, and AH, BH, equal to the lower and upper heights of breadth reſpectively, taken from the ſheer plan. Let I I be the load water line, or line of floatation when the ſhip is loaded, and KK the height of the riſing line of the floor at this frame. Make CN, CO, each equal to half the length of the floor timber, and N, O, will be the heads of the floor timber, through which draw perpendiculars to AB. Make C *m*, E *m*, each equal to half the thickneſs of the ſternpoſt, and C *n*, E *n*, equal to half the thickneſs of the ſtern, and join *m m*, *n n*.

Method I. *Of deſcribing a main frame.*—From the centre *a* (fig. 5), in the lower breadth line, deſcribe the lower breadth ſweep G *e*; make N *b* equal to the propoſed radius of the floor ſweep, and from the centre *b* deſcribe the floor ſweep N *f*. Let the radius of the reconciling ſweep be A *g*, equal to about the half of AC; then make A *h* equal to N *b*, and A *m* equal to G *a*. Now from the centre *a*, with an extent equal to *g m*, deſcribe an arch, and from the centre *b*, with the extent *g h*, deſcribe an arch interſecting the former in *c*, which will be the centre of the reconciling ſweep *e f*. Join N *m* by an inverted curve, the centre of which may be in the line *b* N produced downwards; or it may be joined

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joined by two curves, or by a ſtraight line if there is little riſing; and hence the lower part of the main frame will be deſcribed.

In order to form the top timber, make F *k* equal to ſuch part of the half breadth, agreeable to the propoſed round of the ſide, as one-ſeventh; join H *k*, and make *k i* equal to about two-thirds of H *k*: make the angle H *i l* equal to *i* H *l*; and from the centre *l* at the diſtance *l* H deſcribe the arch H *i*; and from the centre *o*, the interſection of *l i*, and *k* F produced, deſcribe the arch *i k*, and the top timber will be formed.

II. *To deſcribe a main frame of an intermediate capacity, that is, neither too flat nor too ſharp.*—Divide the Fig. 6. line AX (fig. 6.), which limits the head of the floor timber, into three equal parts; and make *a b* equal to one of them. Divide the line *d* B, the perpendicular diſtance between the load water line and the plane of the upper ſide of the keel, into ſeven equal parts; and ſet off one of theſe parts from *d* to *c*, and from *c* to *m*. Let GH be the lower deck, join G *m*, and produce it to *q*. Draw the ſtraight line V *a*, biſect it in *n*, and from the points *n*, *a*, deſcribe arches with the radius G *q* interſecting each other in P, which will be the centre of the arch *n a*. The centre of the arch V *n* is found by deſcribing arches downwards with the ſame radius.

With an extent equal to once and a half of B *e*, deſcribe arches from the points *b*, *e*, interſecting each other in A, and from this point as a centre deſcribe the arch *c b*; make *a l* equal to *d m*, and join A *m*, A *l*. Then, in order to reconcile two arches ſo as to make a fair curve, the centres of theſe arches and of the points of contact muſt be in the ſame ſtraight line. Hence the point *k* will be the centre of the arch *d m*, and *o* the centre of the arch *a l*. The arch *l m* is deſcribed from the centre A.

To form the top timber, ſet back the tenth part of the half breadth from K to S upon the line of the ſecond deck; then with an extent equal to two-thirds of the whole breadth deſcribe an arch through the points S and H, the upper height of breadth. Again, make MI equal to the fifth part of the half breadth; deſcribe an arch of a circle through the points S and T, taking the diagonal GB for the radius. As this arch is inverted in reſpect of the arch *d* S, the centre will be without the figure. Hence one-half of the main frame is formed, and the other half is deſcribed by ſimilar operations.

Remark. This frame may be made more or leſs full by altering the ſeveral radii.

III. *To deſcribe a main frame of a circular form.*—Let the ſeveral lines be drawn as before: Then make Plate cccclxxxvi. O *a* (fig. 7.) equal to the half breadth G *a*, and from Fig. 7. the centre *a*, with the radius G *a*, deſcribe the arch *b* G *c* O. Let *d* be the head of the floor-timber, and *d x* the riſing. Aſſume the point *f* in the arch, according to the propoſed round of the ſecond futtock, and deſcribe the arch *d f*; the centre of which may be found as in the former method: from the centre *a*, with the diſtance *a d*, deſcribe the arch *d c* O; make *d c* equal to one-third of *d* O, and the angle *d c h* equal to *c d h*, and from the centre *h* deſcribe the arch *d c*. The inverted arch *c* O may be deſcribed as before.

IV. *To deſcribe a very full main frame.*—Let the vertical and horizontal lines be drawn as before: let *b*, Fig. 8. fig. 8. be the floor-head, and *b x* the riſing. Divide G *c* into two equal parts in the point *d*, and upon *c d* deſcribe the ſquare *d b a c*, in which inſcribe the quadrant *d e a*. Divide the line *b d* into any number of equal parts in the points O, N, M, L, and draw the lines L *m*, M *c*, N *n*, O *b*, perpendicular to *d b*. Divide the line G C, the depth of the hold, the riſing being deducted, into the ſame number of equal parts in the points E, F, I, K, and make the lines E *p*, F *q*, I *r*, K *s*, in the frame, equal to the lines O *b*, N *n*, M *e*, L *m*, in the ſquare, each to each reſpectively; and through the points G, *p*, *q*, *r*, *s*, *b*, deſcribe a curve. The remaining part of the frame may be deſcribed by the preceding methods.

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V. *To deſcribe the main frame of a ſhip intended to be a faſt ſailer.*—The principal lines being drawn as before, let the length of the floor-timber be equal to half the breadth of the ſhip, and the riſing one-fifth or one-ſixth of the whole length of the floor-timber, which lay off from *x* to E, fig. 9. Through the point E draw the Fig. 9. line T *x* perpendicular to GC, and *d* E perpendicular to AG. Join T *d*, which biſect in B, and draw BF perpendicular thereto, and meeting CG produced in F, from the centre F, at the diſtance FT, deſcribe the ſemicircle T *d* D. Divide GT into any number of parts, VW, &c. and biſect the intervals DV, DW, &c. in the points X, Z, &c.; then, from the centre X, with the extent XV, deſcribe the ſemicircle D *b* V, interſecting AG in *b*. Let VP be drawn perpendicular to GT, and *b* P perpendicular to AG, and the point of interſection P will be one point through which the curve is to paſs. In like manner proceed for the others, and a curve drawn through all the points of interſection will be part of the curve of the main frame. The remaining part of the curve from E to Y will be compoſed of two arches, the one to reconcile with the former part of the curve at E, and the other to paſs through the point Y, the centre of which may be found by any of the preceding methods. In order to find the centre of that which joins with the curve at E, make TR equal to the half of GD, and join ER, in which a proper centre for this arch may be eaſily found.

The portion G *b* E of the curve is a parabola, whoſe vertex is G and parameter GD.

For GD : G *b* :: G *b* : GV by conſtruction.

Hence DG × GV = G b^2, which is the equation for a parabola.

VI. *To deſcribe a main frame of a middling capacity.*—Let the length of the floor-timber be equal to one-half of the breadth of the ſhip. Make O *d*, fig. 10. Fig. 10. equal to one-fourth of the length of the floor-timber, and draw the perpendicular *d c* equal to the riſing, and divide it into two equal parts in the point *e*. Deſcribe an arch through *e*, and the extremity *a* of the floor-timber, the radius being equal to the half breadth, or more or leſs according to the propoſed round of the floor-head. Then with the radius O *l*, half the length of the floor-timber, deſcribe the arch *e* Y.

Draw *l m* perpendicular to OA: biſect A *n* in *p*, and draw the perpendicular *p q*. From the middle of A *p* draw the perpendicular *r s*, and from the middle of A *r* draw the perpendicular *t u*. Make *n z*, *p g*, each equal to *l n*: make the diſtances *p y*, *r b*, each equal to *a g*; *r* F, *t* E, each equal to *a b*; and *t x* equal to *a* E. Then a curve drawn through the points *a*, *z*, *y*, F, *x*, T, will form the under part of the midſhip frame.

We ſhall finiſh theſe methods of deſcribing the main

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frame of a ſhip with the following remark from M. Vial du Clairbois *. "It ſeems (ſays he) that they have affected to avoid ſtraight lines in naval architecture; yet, geometrically ſpeaking, it appears that a main frame formed of ſtraight lines will have both the advantage and ſimplicity over others." To illuſtrate this, draw the ſtraight line MN (fig. 9.) in ſuch a manner that the mixtilineal ſpace M *a d* may be equal to the mixtilineal ſpace DNY. Hence the capacity of the main frame formed by the ſtraight lines MN, NY will be equal to that of the frame formed by the curve M *a* DY; and the frame formed by the ſtraight lines will for the moſt part be always more ſuſceptible of receiving a bow that will eaſily divide the fluid. It is alſo evident, that the cargo or ballaſt, being lower in the frame formed of ſtraight lines than in the other, it will therefore be more advantageouſly placed, and will enable the ſhip to carry more ſail (c); ſo that having a bow equally well or better formed, ſhe will ſail faſter.

* *Architecture Navale*, p. 22.

Traité de Navire de Bouguer, p. 601.

PROB. VI. To deſcribe a ſtern having a ſquare tuck.

Fig. 11.

Let AB (fig. 11.) be the middle line of the poſt, and let CD be drawn parallel thereto at a diſtance equal to half the thickneſs of the poſt. Make CE equal to the height of the lower part of the faſhion-piece above the keel: make CT equal to the height of the extremity G of the tranſom above the plane of the keel produced, and CH equal to the height of the tranſom on the poſt, HT being equal to above one-ninth or one-tenth of GT, and deſcribe the arch GH, the centre of which will be in BA produced: make EK equal to five-twelfths of ET: through K draw KL perpendicular to CD, and equal to EK; and with an extent equal to EL deſcribe the arch EL. Make GI equal to the half of ET, and from the centre I deſcribe the arch GM, and draw the reconciling curve ML.—Let the curve of the faſhion-piece be produced upwards to the point repreſenting the upper height of breadth as at O. Make ON equal to the height of the top-timber, and BN equal to the half breadth at that place, and join ON. Through N and the upper part of the counter, let arches be deſcribed parallel to GH. The taffarel, windows, and remaining part of the ſtern, may be finiſhed agreeable to the fancy of the artiſt.

Fig. 12.

In fig. 12. the projection of the ſtern on the plane of elevation is laid down, the method of doing which is obvious from inſpection.

If the tranſom is to round aft, then ſince the faſhion-pieces are always ſided ſtraight, their planes will interſect the ſheer and floor planes in a ſtraight line. Let G *g* (fig. 14.) be the interſection of the plane of the faſhion-piece with the floor plane. From the point *g* draw *g* W perpendicular to *g* M: make *y k* equal to the height of the tuck, and W *k* being joined will be the interſection of the plane of the faſhion-piece with the ſheer plane. Let the water lines in the ſheer plane produced meet the line *k* W in the points *a*, *s*, *h*, and draw the perpendiculars *aa*, *ſs*, *hh*. From the points *a*, *s*, *h* (fig. 14.) draw lines parallel to G *g* to interſect each correſponding water line in the floor plane in the points 3, 2, 1.

Plate ccccixxxvii. Fig. 14.

From the points G, 3, 2, 1, in the floor-plane draw lines perpendicular to *g* M, interſecting the water lines (fig. 13.) in the points G, 3, 2, 1; and through theſe points deſcribe the curve G 3 2 1 *k*; and WG 3 2, 1 *k* will be the projection of the plane of the faſhion-piece on the ſheer plane. Through the points G, 3, 2, 1 (fig. 13.) draw the lines GF, 3 A, 2 S, 1 H, perpendicular to W *k*; and make the lines WF, *a* A, *s* S, *h* H, equal to the lines *g* G, *a* 3, *s* 2, *h* 1 (fig. 14.) reſpectively, and WFASH *k* will be the true form of the plane of the aft ſide of the faſhion-piece. When it is in its proper poſition, the line WF will be in the ſame plane with the ſheer line; the line *a* A in the ſame plane with the water line *a* 3; the line *s* S in the ſame plane with the water line *s* 2; and the line *h* H in the ſame plane with the water line *h* 1. If lines be drawn from the ſeveral points of interſection of the water lines with the rabbet of the port (fig. 13.), perpendicular to *g* M, and curved lines being drawn from theſe points to G, 3, 2, 1 (fig. 14.) reſpectively, will give the form and dimenſions of the tuck at the ſeveral water lines.

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Fig. 13.

Fig. 14.

PROB. VII. To bevel the faſhion-piece of a ſquare tuck by water-lines.

As the faſhion-piece both rakes and cants, the planes of the water-lines will therefore interſect it higher on the aft than on the fore-ſide: but before the heights on the fore-ſide can be found, the breadth of the timber muſt be determined; which let be *b n* (fig. 15.). Then, as it cants, the breadth in the direction of the water-line will exceed the true breadth. In order to find the true breadth, form the aft-ſide of the faſhion-piece as directed in the laſt problem.

Let *t 5* (fig. 13.) be the aft-ſide of the rabbet on the outſide of the poſt, WM the common ſection of the plan of the faſhion-piece and the ſheer-plan. Before this laſt line can be determined, the ſeveral water-lines 1, 2, 3, 4, and 5, muſt be drawn parallel to the keel, which may repreſent ſo many tranſoms.—Let theſe water-lines be formed and ended at the aft-ſide of the rabbet, as in fig. 14. where the rounds aft of the ſeveral tranſoms are deſcribed, limiting the curves of the water-lines. Now the line WM muſt rake ſo as to leave room for half the thickneſs of the poſt, at the tuck: in order to which, produce W *g* to *r*; make *r g* half the thickneſs of the poſt; through *r* draw a line parallel to *g* M to interſect *g* G in *b*: then with the radius *r b*, from *x* the point of the tuck as a centre, deſcribe an arch, and draw the line WM juſt to touch the back of that arch.

Fig. 13.

The line WM being drawn, let any point *k* in it be aſſumed at pleaſure: from *k* draw *k y* perpendicular to *g* M: through *y* draw *y f* (fig. 14.) parallel to *g* G, interſecting the line M *f* drawn perpendicular to *g* M in the point *f*. From M draw M *i* perpendicular to *y f*, and from *y* draw *y n* perpendicular to WM (fig. 13.). Make M *n* (fig. 15.) equal to M *i* (fig. 14.); then MI (fig. 15.) being equal to *y k* (fig. 13.), join *n* 1, and the angle 1 *n* M will be the bevelling to the horizontal plane. Again, make M *x*, M *f* (fig. 15.) reſpectively equal to *y n* (fig. 13.) and M *f* (fig. 14.), and join *x f*; and

(c) It is not a general rule, that lowering the cargo of a ſhip augments her ſtability. This is demonſtrated by the Chevalier de Borda, in a work publiſhed by M. de Goimpy upon this ſubject. See alſo *L'Architecture Navale par M. Vial du Clairbois*, p. 23.

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and the angle M $z f$ will be the bevelling to the ſheer-plane.

The bevelling being now found, draw the line $a b$ (fig. 15.) parallel to $z n$, $a z$ or $b n$ being the ſcantling of the timber. Then $n x$ will be the breadth of the timber on the horizontal plane, and $z e$ its breadth on the ſheer-plane, and $a c$ what it is within a ſquare.

Fig. 15.

Now as the lines g G, a 3, s 2, h 1, $y i$, repreſent the aft-ſide of the faſhion-piece on the horizontal plane (fig. 14.), dotted lines may be drawn parallel to them to repreſent the fore-ſide, making $n x$ (fig. 15.) the perpendicular diſtance between the lines repreſenting fore and aft ſides of the faſhion-piece. By theſe lines form the fore-ſide of the faſhion-piece in the ſame manner as the aft-ſide was formed. The water-lines on the fore-ſide of the plane of the faſhion-piece muſt, however, be firſt drawn in fig. 13. thus: Draw the lines $e b$, $c d$ parallel to WM, and whoſe perpendicular diſtances therefrom may be equal to $a c$ and $z e$ (fig. 15.) reſpectively. Draw a line parallel to a A through the point where the line $c d$ interſects the fifth water-line. Draw a line parallel to a A through the point where the fourth water-line interſects the line $c d$; in like manner proceed with the other water-lines. The fore-ſide of the faſhion-piece is now to be deſcribed by means of theſe new water-lines, obſerving that the diſtances in the floor-plane muſt be ſet off from the line $e b$, and not from WM, as in the former caſe; and a curve deſcribed through the points 5, 3, 2, 1, where theſe diſtances reach to, will repreſent the fore-ſide of the faſhion-piece.

The neareſt diſtance between the points 5, 3, 2, 1 and the aft ſide of the faſhion-piece is what the bevelling is beyond the ſquare when both ſtock and tongue of the bevel are perpendicular to the timber. Make M p (fig. 16.) equal to the breadth of the timber, and M 5 equal to the perpendicular diſtance of the point 5 (fig. 13.) from the aft-ſide of the faſhion-piece, and join 5 p. In like manner proceed with the others, and the bevellings at theſe parts will be obtained; but, in order to avoid confuſion, the perpendiculars 4, 3, 2, (fig. 13.), inſtead of being laid off from M (fig. 16.), were ſet off from points as far below M as the other extremities of the lines drawn from theſe points are below the point p.

Fig. 16.

PROB. VIII. To deſcribe the tranſoms of a round poop.

The tranſoms are faſtened to the ſtern-poſt in the ſame manner that the floor-timbers are faſtened to the keel, and have a riſing called the *flight* ſimilar to the riſing of the floor-timbers. The upper tranſom is called the *wing* tranſom, the next the *deck* tranſom, and the others the *firſt*, *ſecond*, and *third* tranſoms in order. The wing tranſom has a round aft and a round up: the round up of the deck tranſom is the ſame as that of the beams.

The faſhion-piece of a ſquare tuck muſt be firſt deſcribed, together with the three adjacent frames, by the method to be explained. The part of the ſtern above the wing tranſom is to be deſcribed in the ſame manner as before, and may therefore be omitted in this place. The part below the keel of the faſhion-piece is alſo the ſame in both caſes. Let fig. 17. repreſent the faſhion-piece of a ſquare tuck, and the three adjoining frames. Divide the interval AB into four equal parts in the points C, D, E, and draw the perpendiculars AF, CG, DH, EI, and BK: theſe will be portions of water-lines anſwering to the ſeveral tranſoms.

Plate ccclxxxviii Fig. 17.

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Let theſe water-lines be deſcribed on the floor-plan (fig. 18.), in which ABC repreſents the wing tranſom. Deſcribe the arch bC to reconcile the curves A b and CE. Let LFG be the water-line anſwering to the lower part of the faſhion-piece, the diſtance between the points L and A being equal to the exceſs of the projection of the point A beyond that of B (fig. 20.). Draw CK (fig. 18.) perpendicular to AM, and make the angle KCM equal to about 25 degrees, and CN will be the projection of the faſhion-piece on the floor-plane. Make AB (fig. 19.) equal to AB (fig. 17.). Divide it into four equal parts, and draw the perpendiculars AF, CH, DI, EK, and BG. Make AF equal to CM, and BG equal to MN, and draw the curve FHIKG, having a leſs curvature than the faſhion-piece of the ſquare tuck $s c p g n$. Make MO, MP, MQ, equal to CH, DI, and EK reſpectively. Divide AL (fig. 18.) into four equal parts, and to theſe points of diviſion draw curves through the points O, P, Q, ſo as to partake partly of the curvature of A b CE and partly of that of LNF, but moſt of the curvature of that to which the propoſed curve is neareſt; and hence the form of the ſeveral tranſoms will be obtained.

Fig. 18.

Fig. 19.

In order to repreſent the curve of the faſhion-piece on the plane of projection, make the lines AF, CG, DH, EI, and BK, (fig. 17.) reſpectively equal to the perpendicular diſtance of the points C, O, P, Q, and N. From the line AN (fig. 18.), and through the extremities of theſe lines, draw the curve FGHIK.

It remains to lay down the projection of the faſhion-piece on the plane of elevation. In order to which, divide the line AB, fig. 20. (equal to AB, fig. 17.) into four equal parts, and through the points of diviſion draw the perpendiculars AF, CG, DH, EI, and BK; make AF (fig. 20.) equal to the perpendicular diſtance of the point C from the line BL (fig. 18.). In like manner make the lines CG, DH, EI, and BK (fig. 20.) reſpectively equal to the perpendicular diſtances of the points O, P, Q, and N, from the line BL (fig. 18.); and a curve drawn through theſe points will be the projection of the faſhion-piece on the plane of elevation.

Fig. 20.

PROB. IX. To deſcribe the intermediate frames in the after body.

For this purpoſe the midſhip and ſtern frames muſt be drawn in the plane of projection. As the main frame contains the greateſt capacity, and the ſtern frame is that having the leaſt, it hence follows that the form and dimenſions of the intermediate frames will be between theſe; each frame, however, partaking moſt of the form of that to which it is neareſt.

Let ACDE (fig. 21.) be the main frame on the plane of projection, and FGH the ſtern frame; and let there be any convenient number of intermediate frames, as *nine*. Draw the floor ribband CF, and the breadth ribband GD. Divide the curves CD, FG, each into the ſame number of equal parts, as three, in the points K, M; L, N; and draw the ſecond and third ribbands KL, MN. In order to divide theſe ribbands ſo as to form fair curves in different ſections, various methods have been propoſed. One of the beſt of theſe, being that which is chiefly employed by the French conſtruc-

Fig. 21.

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tors is by means of an equilateral triangle, which is conſtructed as follows.

Fig. 22.

Draw the line ME (fig. 22.), limited at M, but produced towards E: take M 1 equal to any convenient extent; make 1, 2 equal to thrice that extent, 2, 3 equal to five times, and 3, 4 equal to ſeven times the above extent; and continue this diviſion to E, always increaſing by two, until there be as many points as there are frames, including the main and ſtern frames. Upon ME deſcribe the equilateral triangle MSE, and draw lines from the vertex S to each point of diviſion; then the line SM will be that anſwering to the main frame, and SE that correſponding to the poſt; and the other lines will be thoſe anſwering to the intermediate frames in order.

Fig. 23.

Let fig. 23. be the projection of part of the ſtern on the plane of elevation, together with the eighth and ninth frames. From the points L, N, G, (fig. 21.) draw the lines LO, NP, GQ, perpendicular to the plane of the upper edge of the keel. Make AB (fig. 23.) equal to AF (fig. 21.), and draw the water line BCD. Draw the line BC (fig. 22.) ſo that it may be parallel to the baſe of the triangle, and equal to CD (fig. 23.), which produce indefinitely towards H. Make BD equal to BC (fig. 23.), and draw the dotted line SD (fig. 22.). The ribband FC (fig. 21.) is to be applied to the triangle, ſo that it may be parallel to the baſe, and contained between the line MS and the dotted line SD. Let *cf* repreſent this line; then transfer the ſeveral diviſions from *cf* to the ribband CF (fig. 21.), and number them accordingly. Again, make EF (fig. 23.) equal to LO (fig. 21.), and draw the water line FGH; make BF (fig. 22.) equal to FG (fig. 23.), and draw the dotted line SF; apply the ſecond ribband LK to the triangle, ſo that the extremity K may be on the line SM, and the other extremity L on the dotted line SF, and making with SM an angle of about 62½ degrees. Let *kl* be this line, and transfer the diviſions from it to the ribband KL. In like manner make IK (fig. 23.) equal to NP (fig. 21.), and draw the water line KLM. Make BG (fig. 22.) equal to KL (fig. 23.), and draw the dotted line SG; then the ribband MN is to be applied to the triangle in ſuch a manner that its extremities M and N may be upon the lines SM, SG reſpectively, and that it may make an angle of about 68 degrees with the line SM; and the diviſions are to be transferred from it to the ribband MN. The ſame proceſs is to be followed to divide the other ribbands, obſerving to apply the fourth ribband to the triangle, ſo that it may make an angle of 86 degrees with the line SM; the fifth ribband to make an angle of 65 degrees, and the ſixth an angle of 60 degrees with the line SM.

The quantities of theſe angles are, however, far from being preciſely fixed. Some conſtructors, in applying the ribbands to the triangle, make them all parallel to its baſe; and others vary the meaſures of theſe angles according to fancy. It may alſo be remarked, that a different method of dividing the baſe of the triangle is uſed by ſome. It is certainly proper to try different methods; and that is to be preferred which beſt anſwers the intended purpoſe.

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Beſide the frames already mentioned, there are other two laid down by ſome conſtructors in the ſeveral plans, called *balance frames*. The after balance frame is placed at one fourth of the length of the ſhip before the ſternpoſt; and the other, commonly called the *looſ frame*, at one fourth of the ſhip's length aft of a perpendicular to the keel from the rabbet of the ſtem. Let the dotted line at X, between the fifth and ſixth frames, (fig. 23.) be the place of the after balance frame in the plane of elevation. Then, in order to lay down this frame in the plane of projection, its repreſentation muſt be previouſly drawn in the triangle. To accompliſh this, draw the line SV (fig. 22.) ſo that the interval 5V may have the ſame ratio to 5 6 (fig. 22.) that 5 X has to 5 6 (fig. 23.) (D). Then the ſeveral points in the ribbands in the plane of projection anſwering to this frame are to be found by means of the triangle in the ſame manner as before.

The looſ frame is nearly of the ſame dimenſions as the after balance frame, or rather of a little greater capacity, in order that the centre of gravity of that part of the ſhip may be nearly in the plane of the midſhip frame. Hence the looſ frame may be eaſily drawn in the plane of projection, and hence alſo the other frames in the fore body may be readily deſcribed.

PROB. X. To deſcribe the frames in the fore body.

Fig. 24.

Draw the middle line of the ſtem AB (fig. 24.); make AC, BD each equal to half the thickneſs of the ſtem, and draw the line CD; deſcribe alſo one half of the main frame CEFGHI. Let *e* E, *f* F, *g* G, *h* H, be water lines at the heights of the ribbands on the main frame; alſo let *a* be the termination of the floor ribband, and *b* that of the breadth ribband on the ſtem. Divide the interval *a b* into three equal parts in the points *c*, *d*, and draw the ribbands *a* E, *c* F, *d* G, and *b* H. Make *e i*, *f k*, *g l*, *h m* (fig. 24.) equal to *e i*, *f k*, *g l*, *h m* (fig. 21.) reſpectively, and draw the curve C *i k l m*, which will be the projection of the looſ frame. Or ſince it is neceſſary that the capacity of the looſ frame ſhould be a little greater than that of the after balance frame, each of the above lines may be increaſed by a proportional part of itſelf, as one tenth or one twentieth, as may be judged proper.

Fig. 25.

Conſtruct the triangle (fig. 25.) in the ſame manner as fig. 22. only obſerving, that as there are fewer frames in the fore than in the after body, its baſe will therefore be divided into fewer parts. Let there be eight frames in the fore body, then there will be eight diviſions in the baſe of the triangle beſide the extremes.

Let fig. 26. repreſent the ſtem and part of the forebody in the plane of elevation, and let O be the place of the looſ frame. Divide the interval 4, 5 (fig. 25.) ſo that 4, 5 may be to 4 Z as 4, 5 to 4, 0 (fig. 26.), and draw the dotted line SZ, which will be the line denoting the looſ frame in the triangle.

Fig. 26.

Draw the lines AB, CD, EF, GH (fig. 26.) parallel to the keel, and whoſe perpendicular diſtances therefrom may be equal to C *a*, C *c*, C *d*, C *b*, (fig. 24.) the interſections

(D) It is evident, from the method uſed to divide the baſe of the triangle, that this proportion does not agree exactly with the conſtruction: the difference, however, being ſmall, is therefore neglected in practice.

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interſections of theſe lines with the rabbet of the ſtem, namely, the points I, K, L, M will be the points of termination of the ſeveral ribbands on the ſtem in the plane of elevation. Divide 8 A (fig. 25.) ſo that 8 B, 8 C, 8 D, and 8 E, may be reſpectively equal to BI, DK, FL, and HM (fig. 26.), and draw the dotted lines SB, SC, SD, SE (fig. 25.). Apply the edge of a ſlip of card to the firſt ribband (fig. 24.), and mark thereon the extremities of the ribband *a*, E, and alſo the point of interſection of the loof frame. Then apply this ſlip of card to the triangle in ſuch a manner that the point *a* may be on the dotted line SB, the point E on the line SM, and the point anſwering to the loof frame on the dotted line SZ; and mark upon the card the ſeveral points of interſection of the lines S 1, S 2, &c. Now apply the card to the ribband *a* E (fig. 24.) as before, and transfer the ſeveral points of diviſion from it to the ribband. In like manner proceed with the other ribbands; and lines drawn through the correſponding points in the ribbands will be the projection of the lower part of the frames in the fore body. The projections of the top-timbers of the ſeveral frames may be taken from the half breadth plan; and hence each top-timber may be eaſily deſcribed.

In large ſhips, particularly in thoſe of the French navy, a different method is employed to form the top-timbers in the fore body, which is as follows:

Plate ccccIxxxix. Fig. 27.

Let BI (fig. 27.) be one fourth of the breadth of the ſhip, and draw IK parallel to AB. Take the height of the foremoſt frame from the plane of elevation, and lay it off from A to B: from the point B draw BH perpendicular to AB, and equal to half the length of the wing tranſom. Let E be the place of the breadth ribband on the main frame, and F its place on the ſtem at the height of the wing tranſom. With a radius equal to five ſixths of half the greateſt breadth

Fig. 28.

of the ſhip deſcribe the quadrant EFG (fig. 28.): Make EH equal to FG (fig. 27.), the point F being at the height of the wing tranſom. Through H draw HO perpendicular to EH, and interſecting the circumference in O; then draw OL parallel to HE, and EL parallel to HO. Divide EL into as many equal parts as there are frames in the fore body, including the main frame, and from theſe points of diviſion draw the perpendiculars 11, 22, &c. meeting the circumference as in the figure. Take the diſtance 11, and lay it off from G (fig. 27.) towards F to the point 1; and from the ſame point G lay off towards F the ſeveral perpendiculars contained between the ſtraight line and the curve to the points 2, 3, &c. and through theſe points draw lines parallel to EG.

Fig. 29.

Take any line AB (fig. 29.) at pleaſure: divide it equally in two in the point 8: divide 8 B in two parts in the point 7, and continue this method of diviſion until there are as many points as there are frames in the fore body, including the main frame. Upon AB conſtruct the equilateral triangle ACB, and draw the lines C 8, C 7, &c. Place a ſlip of card on the parallel *a* K 8 (fig. 27.), and mark thereon the points oppoſite to *a*, K, and 8; and let them be denoted accordingly. Then apply this ſlip of card to the triangle, ſo that the point *a*, which is that anſwering to the rabbet of the ſtem, may be on the line AC; that the point anſwering to K may be on C 8, and the extremity 8 on the line CB; and mark on the card the points of interſection of the lines C 7, C 6, &c. and number them accordingly. Now apply this ſlip of card to the ſeventh parallel (fig. 23.), the point *a* being on the line CD, and mark on this parallel the point of interſection 7; ſlide the card down to the ſixth parallel, to which tranſfer the point N° 6. In like manner proceed with the other parallels. Preliminary Problems.

The point K, at the interſection of the line IK with the eighth parallel, is one point through which the eighth frame paſſes. From this point upwards a curve is to be deſcribed ſo as to reconcile with the lower part of this frame already deſcribed, and the upper part, forming an inverted arch, which is to terminate at H. This top-timber may be formed by two ſweeps, whoſe radii and centres are to be determined partly from circumſtances and partly according to fancy. It however may be more readily formed by hand.

Let LM (fig. 27.) be the line of the ſecond deck at the main frame, and let LN be the difference of the draught of water, if any. Make GN (fig. 28.) equal to LN: draw NM perpendicular to GN, meeting the circle in M; and through the points G and M draw the parallels GV and MV; divide GN as before, and from the ſeveral points of diviſion draw perpendiculars terminating in the curve. Transfer theſe perpendiculars from L upwards (fig. 27.), and through the points thus found draw the lines 11, 22, &c. parallel to LM. Apply a ſlip of card to the eighth parallel, and mark upon it the point anſwering to the ſtem, the eighth and main frames: carry this to the triangle, and place it ſo that theſe points may be on the correſponding lines. Then the points of interſection of the lines C 7, C 6, &c. are to be marked on the card, which is now to be applied firſt to the eighth parallel (fig. 27.), then to the ſeventh, &c. transferring the ſeveral points of diviſion in order as before.

Draw the line HO (fig. 27.); mark its length on a ſlip of card, and apply it to the triangle, ſo that it may be parallel to its baſe, and its extremities one on the eighth and the other on the main frame: mark on the card the points of interſection of the ſeveral intermediate lines as before; then apply the card to HO, and transfer the diviſions.

There are now three points determined through which each top-timber muſt paſs, namely, one in the breadth ribband, one in the fifth, and one in the upper ribband. Through theſe curves are to be deſcribed, ſo as to reconcile with the lower part of the frame, and partake partly of the curvature of the eighth frame, and partly of that of the main frame, but moſt of that of the frame to which it is neareſt: and hence the plane of projection is ſo far finiſhed, that it only remains to prove the ſeveral frames by water lines.

Another method of deſcribing the frames in the body plan is by ſweeps. In this method it is neceſſary, in the firſt place, to deſcribe the height of the breadth lines, and the riſing of the floor, in the plane of elevation. The half breadth lines are next to be deſcribed in the floor plan. The main frame is then to be deſcribed by three or more ſweeps, and giving it ſuch a form as may be moſt ſuitable to the ſervice the ſhip is deſigned for. The lower, upper, and top-timber heights of breadth, and the riſings of the floor, are to be ſet upon the middle line in the body plan, and the ſeveral half breadths are then to be laid off on lines drawn through

theſe

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these points perpendicular to the middle line. A mould may then be made for the main frame, and laid upon the several risings, as in whole mouldings, explained in Chapter V. with this difference, that here an under breadth sweep is described to pass through the point which limits the half breadth of the timber, the centre of which will be in the breadth line of that timber. The proper centres for all the frames being found, and the arches described, the bend mould must be so placed on the rising line of the floor, that the back of it may touch the back of the under breadth sweep. But the general practice is, to describe all the floor sweeps with compasses, as well as the under breadth sweeps, and to reconcile these two by a mould which is an arch of a circle, its radius being the same with that of the reconciling sweep by which the midship frame was formed. It is usual for all the floor sweeps to be of the same radius; and in order to find their centres a line is formed on the floor plan for the half breadth of the floor. As this line cannot be described on the surface of a ship, it is therefore only an imaginary line. Instead of it some make use of a diagonal in the body plane to limit the half breadth of the floor upon every rising line, and to erect perpendiculars at the several intersections, in the same manner as for the midship frame.

After the sweeps are all described, recourse is had to moulds, or some such contrivance, to form the hollow of the timbers, much in the same manner as in whole moulding; and when all the timbers are formed, they must be proved by ribband and water lines, and altered, if necessary to make fair curves.

The preceding methods of describing the several planes or sections of a ship being well understood, it will be a very easy matter to construct draughts for any proposed ship: and as the above planes were described separately and independent of each other, it is therefore of little consequence which is first described. In the following application, however, the plane of elevation will be first drawn, then part of the floor plan, and lastly the body plan: and in connecting these plans the most rational and simple methods will be employed.

Chap. IV. *Application of the foregoing Rules to the Construction of Ships.*

Sect. I. *To construct a Ship intended to carry a considerable Burden in Proportion to her general Dimensions, and to draw little Water.*

Dimensions.

	F.	In.
Length between the wing transome and a perpendicular from the rabbet of the stem at the height of breadth line -	80	0
Main half breadth moulded -	11	0
Half breadth at the height of breadth line at the stern - -	7	6
Top-timber half breadth - -	10	6
Height of the stem above the upper edge of the keel - -	17	0
Height of the breath line at the stem	13	6
Height of the breadth line at the stern -	12	3
Upper height of breadth at the main frame	7	4
Lower height of breadth - -	5	10
Height of middle line of wales at the stem	10	0
Height of middle line of wales at the main frame - -	6	10
Height of middle line of wales at the stern	10	6
Breadth of the wales - -	1	9
Height of top-timber at midships -	14	0
——— at stern -	18	0

Application of the foregoing Rules to the Construction of Ships.

Plate CCCCXC. Fig. 30.

Draw the line *a b* (fig. 30.) equal to 80 feet, from a convenient scale: divide it into as many equal parts plus one as there are to be frames, which let be 16, and through each point of division draw perpendiculars. Make *b c* equal to 17 feet, the perpendicular height of the top of the stem above the upper edge of the keel, and describe the stem by Prob. II. Make *a d* equal to 10½ feet, the height of the middle line of the wales at the stern, and *a e* equal to the proposed rake of the post, which may be about 2 feet: join *d e*; and draw the line *f g* representing the aft-side of the post. Describe the counter and stern by Problem VI. and VII. Make ⊕*h* equal to 14 feet, the top-timber height at the main frame, and *i k* equal to 18 feet, the height at the stern; and through the three points *c*, *h*, *k*, describe the curve limiting the top-timbers by Problem I. Make *b d* equal to 10 feet, the height of the middle line of the wales at the stem, and ⊕H equal to 6 feet 10 inches, the height at the main frame; and the curve *d* H *d* being described will represent the middle line of the wales. At the distance of 10½ inches on each side of this line draw two curves parallel thereto, and the wales will be completed in this plan. Make *b l* equal to 13½ feet, the height of the breadth line at the stem; *a m* equal to 12¾ feet, the height at the stern; and I⊕ K⊕ equal to 5 feet 10 inches and 7 feet 4 inches respectively; and draw the upper breadth line *l* K *m* and lower breadth line *l* I *m*. From the line *a b* lay downwards the breadth of the keel, which may be about one foot, and draw the line L *t* parallel to *a b*.

Let the line L *r*, which is the lower edge of the keel, represent also the middle line of the floor plan. Produce all the perpendiculars representing the frames: make ⊕ M (fig. 31.) equal to 11 feet, the main half breadth at midships; through *m* (fig. 30.) draw the line *m* N perpendicular to *a b*, and make *p* N equal to 7½ feet, and draw the main half breadth line NM *r* by Problem IV. Describe also the top-timber half breadth line PO *r*, ⊕O being equal to 10½ feet, and form the projecting part of the stem *q r s t*. Fig. 31.

In order that the top-timber line may look fair on the bow, and to prevent the foremost top-timbers from being too short, it is necessary to lift or raise the sheer from the round of the bow to the stem. For this purpose the following method is usually employed: Produce the circular sheer before the stem in the plane of elevation at pleasure; then place a batton to the round of the bow in the half breadth plan, and mark on it the stations of the square timbers and the side of the stem; apply the batton to the sheer plan, and place it to the sheer of the ship, keeping the stations of the timbers on the batton well with those on the sheer plan for several timbers before dead-flat, where they will not alter; then mark the other timbers and the stem on the sheer line produced; through these points draw lines parallel to the keel, to intersect their corresponding timbers and the stem in the sheer plan: then a curve described these last points will be the sheer of the ship round

the

Application of the foregoing Rules to the Conſtruction of Ships.

the bow, lifted as required: and the heights of the timbers thus lengthened are to be transferred to the body plan as before.

Plate cccclxxxix. Fig. 32.

Draw the line AB (fig. 32.) equal to 22 feet, the whole breadth; from the middle of which draw the perpendicular CD: make CE equal to half the thickneſs of the poſt, and CF equal to half that of the ſtem, and from the points A, E, F, B, draw lines parallel to CD. Make AG, BG each equal to 14 feet, the height at the main frame, and draw the line GG parallel to AB. Make GH, GH each equal to half a foot, the difference between the main and top timber half-breadths. From A and B ſet up the heights of the lower and upper breadth lines to I and K, and draw the ſtraight lines IK, IK. Let CL be the riſing at the main frame, and ⊕, ⊕ the extremities of the floor timber. Hence, as there are now five points determined in each half of the main frame, it may be very eaſily deſcribed.

Make CM equal to L⊕, join M⊕, and draw the other ribbands NO, PQ. In order, however, to ſimplify this operation, the rectilineal diſtance ⊕I was triſected, and through the points of diviſion the lines NO, PQ were drawn parallel to the floor ribband M⊕.

Take the diſtance *b c* (fig. 30.), and lay it off from F to (fig. 32.); alſo make F*b* (fig. 32.) equal to F*u* (fig. 30.); through *b* draw *b c* parallel to AB, and equal to FR (fig. 31.). In like manner take the heights of each top-timber from fig. 30. and lay them off from C towards D (fig. 32.); through theſe points draw lines parallel to AB, and make them equal each to each, to the correſponding half breadth lines taken from the floor-plan: Then through the ſeveral points *a*, *c*, &c. thus found, draw a line *a c* H, which will be the projection of the top-timber line of the fore body in the body plan. Proceed in the ſame manner to find the top-timber line in the after body.

Transfer the height of the main-breadth line on the ſtem *b l* (fig 30.), from F to *d* (fig. 32.). Transfer alſo the heights of the lower and upper breadth lines at timber F (fig. 30.), namely, FW, FX, from F to *e* and *f* (fig. 32.); through which draw the parallels *e g*, *f h*; make them equal to FS (fig. 31.), and draw the ſtraight line *g h*. In this manner proceed to lay down the portions of the extreme breadth at each frame, both in the fore and in the after body in the body plan, and draw the upper and lower breadth lines *d h* K, *d g* I in the fore body and K*i*, I*i* in the after body. Hence the portions of the ſeveral top-timbers contained between the top-timber and main breadth lines may be eaſily deſcribed. It was before remarked that their forms were partly arbitrary. The midſhip top-timber has generally a hollow, the form of which is left entirely to the artiſt, though in ſome ſhips, eſpecially ſmall ones, it has none. It is the common practice to make a mould for this hollow, either by a ſweep or ſome other contrivance, which is produced conſiderably above the top-timber line, in a ſtraight line or very near one. The midſhip top-timber is formed by this mould, which is ſo placed that it breaks in four with the back of the upper breadth ſweep. The other top-timbers are formed by the ſame mould, obſerving to place it ſo that the ſtraight part of it may be parallel to the ſtraight part of the midſhip timber, and moved up or down, ſtill keeping it in that direction till it juſt touches the back of the upper breadth ſweep.

Application of the foregoing Rules to the Conſtruction of Ships.

Some conſtructors begin at the after timber, after the mould is made for the midſhip top-timber, becauſe they think it eaſier to keep the ſtraight part of the mould parallel to this than to the midſhip timber; and by this means the top ſide is kept from winding. Others, again, make a mark upon the mould where the breadth line of the midſhip timber croſſes it, and with the ſame mould they form the after timber: this will occaſion the mark that was made on the mould when at the main frame to fall below the breadth line of the after timber, and therefore another mark is made at the height of the breadth line at the after timber; the ſtraight part of the mould is then laid obliquely acroſs the breadth lines of the top-timbers in ſuch a manner that it may interſect the breadth line of the midſhip timber at one of theſe marks and the breadth line of the after timber at the other mark; then the ſeveral interſections of the breadth lines of the timbers are marked upon the mould; which muſt now be ſo placed in forming each timber, that the proper mark may be applied to its proper breadth, and it muſt be turned about ſo as juſt to touch the upper breadth ſweep. Any of theſe methods may make a fair ſide, and they may be eaſily proved by forming another intermediate half breadth line.

The remaining parts of the frames may be deſcribed by either of the methods laid down in Problems IX. and X. In order, however, to illuſtrate this ſtill farther, it is thought proper to ſubjoin another method of forming the intermediate frames, the facility of which will recommend it.

Take FZ (fig. 30.), and lay it from F to *k* (fig. 32.); then deſcribe the lower part of the foremoſt frame, making it more or leſs full according as propoſed; and interſecting the ribbands in the points *l*, *m*, *n*. Deſcribe alſo the aftermoſt frame *o*, *p*, *q*. Make $\alpha\beta$ (fig. 30.) equal to F*r* (fig. 32.), and produce it to *a* (fig. 31.); alſo draw $\gamma\delta$ and $\varepsilon\zeta$ (fig. 30.) equal to E*r* and E*s* (fig. 32.) reſpectively; and produce them to *b* and *c*: Make F*e*, F*f*, FR (fig. 31.) equal to M*l*, N*m*, P*n* (fig. 32.) each to each. Let alſo ⊕ *h*, ⊕ *i*, ⊕ *k*, and 9 *l*, 9 *m*, 9 *n* (fig. 31.) be made equal to M⊕, NO, PQ, and M*o*, N*q*, P*p* (fig. 32.); then through theſe points trace the curves *a e n h l b*, *r f i m c*, and *r* R *k n p*, and they will be the projections of the ribbands in the floor plane. Now transfer the ſeveral intervals of the frames contained between the middle line and the ribbands (fig. 31.) to the correſponding ribbands in the body plan (fig. 32.). Hence there will be five points given in each frame, namely, one at the lower breadth line, one at each ribband, and one at the keel; and conſequently theſe frames may be eaſily deſcribed. In order to exemplify this, let it be required to lay down the frame E in the plane of projection. Take the interval E*n* (fig. 31.), and lay it from M to *u* (fig. 32). Lay off alſo E*v*, E*e* (fig. 31.) from N to *v* and from P to *n* (fig. 32.); then through the points F, *u*, *v*, *n* and the lower breadth line deſcribe a curve, and it will be the repreſentation of the frame E in the body plan. In like manner the other frames may be deſcribed.

The ribbands may now be transferred from the body plan to the plane of elevation, by taking the ſeveral heights of the interſection of each ribband with the frames, and laying them off on the correſponding frames in the floor plan; and if the line drawn through theſe

points

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points make a fair curve, it is preſumed that the curves of the frames are rightly laid down in the body plan. Only one of theſe ribbands, namely, the firſt, is laid down in fig. 30. Theſe curves may alſo be farther proved, by drawing water lines in the plane of elevation, and in the body plan, at equal diſtances from the upper edge of the keel. Then the diſtances between the middle line of the body plan, and the ſeveral points of interſection of theſe lines with the frames, are to be laid off from the middle line in the floor plan upon the correſponding frames; and if the line drawn through theſe points form a fair curve, the frames are truly drawn in the body plan.

In figs. 30. and 32. there are drawn four water lines at any equal diſtances from the keel, and from each other. Theſe lines are then transferred from fig. 32. to fig. 31.; and the lines paſſing through theſe points make fair curves.

The tranſoms are deſcribed by Problem VIII. it is therefore unneceſſary to repeat the proceſs. A riſing line of the floor timbers is commonly drawn in the plane of elevation.

As this is intended only as an introductory example, ſeveral particulars have therefore been omitted; which, however, will be exemplified in the following ſection.

SECT. IV. *To deſcribe the ſeveral Plans of a Ship of War propoſed to carry* 80 *Guns upon two Decks.*

As it is propoſed in this place to ſhow the method of deſcribing the plans of a ſhip of a very conſiderable ſize, it therefore ſeems proper to give the dimenſions of every particular part neceſſary in the delineation of theſe plans. The ſeveral plans of this ſhip are contained in figs 33, and 34. But as it would very much confuſe the figures to have a reference to every operation, and as the former example is deemed a ſufficient illuſtration, the letters of reference are upon theſe accounts omitted in the figures.

Plate CCCCXCI. Figs. 33. & 34.

PRINCIPAL DIMENSIONS.

Ship Builder's Repoſitory.

	F.	In.
Lengths.—Length on the gun or lower deck from the aft part of the rabbet of the ſtem to the aft part of the rabbet of the poſt	182	0
Length from the foremoſt perpendicular to dead flat	63	11¾
Length from the foremoſt perpendicular to timber Y	4	0
Length from after perpendicular to timber 37	3	4
Room and ſpace of the timbers	2	8¾
Length of the quarter-deck from the aft part of the ſtern	95	0
Length of the forecaſtle from the fore part of the beak-head	49	0
Length of round-houſe deck from the aft part of the ſtern	51	8
Heights.—Height of the gun or lower deck from the upper edge of the keel to the under ſide of the plank at dead flat	24	0
Height of the gun or lower deck from the upper edge of the keel to the under ſide of the plank at foremoſt perpendicular	26	
Height of the gun or lower deck from the upper edge of the keel to the under ſide of the plank at after perpendicular	26	3
Height from the upper ſide of the gun-deck plank to the under ſide of the upper deck plank, all fore and aft	7	0
Height from the upper ſide of the upper deck plank to the under ſide of the greater deck plank — afore	6	10
Height from the upper ſide of the upper deck plank to the under ſide of the greater deck plank — abaft	6	11
Height to the under ſide of forecaſtle plank, afore and abaft	6	6
Height from the upper ſide of the quarter-deck plank to the under ſide of the round-houſe plank — afore	6	9
Height from the upper ſide of the quarter-deck plank to the under ſide of the round-houſe plank — abaft	6	10
Height of the lower edge of the main wales at foremoſt perpendicular	24	6
Height of the lower edge of the main wales at dead flat	20	0
Height of the lower edge of the main wales at after perpendicular	26	6
Height of the lower edge of the channel wales at foremoſt perpendicular	32	6
Height of the lower edge of the channel wales at dead flat	29	0
Height of the lower edge of the channel wales at after perpendicular	34	0
Height of the upper ſide of the wing tranſom	28	4
Height of the touch of the lower counter at the middle line	33	5
Height of the touch of the upper counter at the middle line	36	2
Height of the top-timber line at the after part of the ſtern timber	44	7
Breadths.—Main wales in breadth from lower to upper edge	4	6
Channel wales in breadth from lower to upper edge	3	0
Waiſt rail in breadth	0	7
Diſtance between the upper edge of the channel wales and the under edge of the waiſt rail	2	9
Sheer rail in breadth	0	6
Diſtance between the ſheer rail and the rail above from timber 13 to the ſtern	2	5
Diſtance between the ſheer rail and the rail above from timber 7 to timber 11	1	4
Diſtance between the ſheer rail and the rail above from timber C to the forepart of beak-head	1	2
And the ſaid rail to be in breadth	0	6
Plank ſheer to be in thickneſs	0	2½
Centres of the maſts.—From the foremoſt perpendicular to the centre of the mainmaſt on the gun-deck	103	2
From the foremoſt perpendicular to the centre of the foremaſt on the gun-deck	20	5
From the after perpendicular to the centre of the mizenmaſt on the gun-deck	28	6
Stem.—The centre of the ſweep of the ſtem abaft timber P	0	4
Height of ditto from the upper edge of the keel	26	1
Stem moulded	1	3

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Foremoſt

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	F.	In.
Foremoſt part of the head afore the perpendicular	2	4
Height of ditto from the upper edge of the keel	38	3
Stern-poſt.—Aft part of the rabbet afore the perpendicular on the upper edge of the keel	3	4
Aft part of the port abaft the rabbet at the upper edge of the keel	2	6
Aft part of the port abaft the rabbet at the wing tranſom	1	1
Stern-port fore and aft on the keel	3	1
Ditto ſquare at the head	2	0½
Counters.—The touch of the lower counter at the middle line, abaft the aft part of the wing tranſom	7	6
Round aft of the lower counter	1	4
Round up of the lower counter	0	9
The touch of the upper counter at the middle line, abaft the aft part of the wing tranſom	9	9
Round aft of the upper counter	1	3½
Round up of the upper counter	0	10
Aft part of the ſtern-timber at the middle line, at the height of the top timber line, abaft the aft part of the wing tranſom	12	6
Round aft of the wing tranſom	0	6
Round up of the wing tranſom	0	5½
Draught of water.—Load draught of water from the upper edge of the keel — afore	20	5
Draught of water.—Load draught of water from the upper edge of the keel — abaft	20	5
Channels.—Foremoſt end of the fore channel afore timber R	1	0
The channel to be in length	37	0
And in thickneſs at the outer edge	0	4½
The dead eyes to be 12 in number, and in diameter	1	6
Foremoſt end of the main channel afore timber 9	0	10
The channel to be in length	38	0
And in thickneſs at the outer edge	0	4½
The dead eyes to be 14 in number, and in diameter	1	6
Foremoſt end of the mizen-channel abaft timber 27	2	4
The channel to be in length	20	0
And in thickneſs at the outer edge	0	4
The dead eyes to be 7 in number, and in diameter	1	0

Application of the foregoing Rules to the Conſtruction of Ships.

DIMENSIONS of the ſeveral Parts of the Bodies.

Fore Body.	*Timbers Names.* ⊕ Ft.	⊕ In.	C Ft.	C In.	G Ft.	G In.	L Ft.	L In.	P Ft.	P In.	T Ft.	T In.	W Ft.	W In.	Y Ft.	Y In.
Lower height of breadth	22	6	22	6	22	7	23	0	23	11	25	7	26	10	28	8
Upper height of breadth	24	10	24	10	24	10	24	10½	25	3½	26	4½	27	4½	29	0
Height of the top-timber line	37	5	37	7	38	0	38	5	39	1	39	10	40	4	40	9
Height of the riſing line *	0	0	0	5½	3	10	9	10	18	6						
Height of the cutting down	2	3½	2	3½	2	3½	2	8	3	10	6	4				
Main half breadth	24	5½	24	5½	24	4½	24	0½	23	2½	20	2	17	0	11	0½
Top-timber half breadth	20	11	20	10	20	9	20	6	20	0	18	9½	17	10	16	6
Half breadth of the riſing	8	7	8	4	6	5½	2	9	5 Outſide	7						
Length of the lower breadth ſweeps	19	2	18	9	18	3	17	3	15	11	14	1	12	7	12	0
Firſt diagonal line	7	9	7	8¾	7	7	7	1	6	3	3	8				
Second ditto	13	9	13	8½	13	4½	12	1	10	3	7	1½	4	6		
Third ditto	20	0	19	11	19	2	17	7	15	1	11	1	8	3¼	3	4½
Fourth ditto	23	4½	23	4½	23	0	21	8½	18	11	14	8½	11	5	6	0
Fifth ditto	24	8	24	8	24	4½	23	5½	21	2½	17	1	13	8½	7	11
Sixth ditto																
Seventh ditto	24	1½	24	1½	24	0	23	9	22	10	20	10½	18	6½	14	7

* Riſing height 11 feet 10 inches at dead flat, from which all the other riſings muſt be ſet off.

After Body.	*Timbers Names.*																					
	1		5		9		13		17		21		25		29		33		35		37	
	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft	In.	Ft.	In.	Ft.	In.
Lower height of breadth -	22	6	22	6	22	6	20	7½	22	9	23	0½	27	7½	24	6	25	10¾	26	9¾	28	3
Upper ditto - -	24	10	24	10	24	10	24	11	25	1	25	4	25	8	26	3	27	1	27	9	28	8
Height of the top-timber line	37	5	37	5	37	6	37	10	38	3½	38	11	39	8	40	6	41	5	42	0	42	6
Height of the cutting down -	2	3½	2	3½	2	3½	2	3½	2	4	2	7½	3	5	5	2½	8	7				
Height of the riſing -	0	2½	0	8½	1	9½	3	6½	6	0	10	1	17	0								
Main half breadth - -	24	5¼	24	4¾	24	4¼	24	3¼	24	1	23	8½	23	0½	21	10						
Half breadth of the riſing -	8	6	8	3	7	9	6	10½	5	3½	2	8	2	6	Outſide							
Top-timber half breadth -	20	11	20	10	20	9½	20	9	20	7	20	3	19	5	18	2	16	8	15	10½	15	0¼
Topſides half breadth -											19	7	18	4	17	0	15	10	14	11	14	3
Length of lower breadth ſweeps	19	2	19	2	19	0	18	7	17	1	16	0	14	5	12	5	9	10½	7	11	4	8
Firſt diagonal - -	7	9	7	8¼	7	7	7	5	7	2½	6	7	5	9	4	7	2	10	1	8½	0	7
Second ditto - -	13	9	13	8½	13	6	13	1	12	6	11	2	9	7	7	7	4	8¼	3	1	0	11
Third ditto - -	20	0	19	11¼	19	7½	19	0	18	1½	16	6	14	2	11	5½	7	8½	5	5	2	1½
Fourth ditto - -	23	4½	23	3	23	1½	22	6½	21	11	20	3	18	0½	15	3½	11	4	8	7	4	6¼
Fifth ditto - -	24	8	24	7	24	6	24	1½	23	6½	22	3½	20	6½	18	2	14	4	11	5	7	0
Sixth ditto - -																	18	8½	16	0	11	8
Seventh ditto - -											23	9½	23	0	21	8½	20	0	18	11	17	8¾

DIAGONAL LINES for both the FORE and AFTER BODIES.

Fore and After Bodies.	*Names of the Diagonal Lines.*													
	1ſt		2d		3d		4th		5th		6th		7th	
	Ft.	In.	Ft.	In.	Ft.	In	Ft.	In.	Ft.	In.	Ft	In.	Ft.	In.
Height up the middle line - -	6	11	11	4	16	5¼	20	8	23	5¼	27	5	43	9
Diſtance from the middle line on the baſe line	4	8	9	1	15	6								
Height up the ſide line - - -							0	9½	6	7	12	7½	32	8½

I. *Of the Sheer Draught or Plane of Elevation.*

Fig. 33. Draw a ſtraight line (fig. 33.) to repreſent the upper edge of the keel, erect a perpendicular on that end to the right, and from thence ſet off 182 feet, the length on the gun-deck, and there erect another perpendicular; that to the right is called the *foremoſt* perpendicular, and the other the *after* one: upon theſe two perpendiculars all the foremoſt and aftermoſt heights muſt be ſet off, which are expreſſed in the dimenſions.

Then ſet off the diſtance of the main frame or dead flat from the foremoſt perpendicular, and at that place erect a third perpendicular, which muſt be diſtinguiſhed by the character ⊕. From dead flat the room and ſpace of all the timbers muſt be ſet off; but it will only be neceſſary to erect a perpendicular at every frame timber; which in the fore body are called *dead flat*, A, C, E, &c. and in the after body (2), 1, 3, 5, &c.: hence the diſtance between the frame perpendiculars will be double the room and ſpace expreſſed in the dimenſions. Then ſet off the heights of the gun-deck afore at midſhip or dead flat, and abaft from the upper ſide of the keel; and a curve deſcribed through theſe three points will be the upper ſide of the gun-deck. Set off the thickneſs of the gun-deck plank below that; and another curve being drawn parallel to the former, the gun-deck will then be deſcribed at the middle line of the ſheer plan.

The centre of the ſtem is then to be laid down by means of the table of dimenſions; from which centre, with an extent equal to the neareſt diſtance of the upper edge of the keel, deſcribe a circle upwards: deſcribe alſo another circle as much without the former as the ſtem is moulded. Then ſet off the height of the head of the ſtem, with the diſtance afore the perpendicular, and there make a point; and within that ſet off the moulding of the ſtem, and there make another point: from this laſt mentioned point let a line paſs downwards, interſecting the perpendicular at the height of the gun-deck, and breaking in fair with the inner circle, and the after part of the ſtern is drawn. Draw another line from the foremoſt point downwards, parallel to the former, and breaking in fair with the outer circle; then the whole ſtem will be formed, except the after or lower end, which cannot be determined till hereafter.

The ſtern-poſt muſt be next formed. Set off on the upper edge of the keel a ſpot for the aft part of the rabbet taken from the dimenſions, and from that forward ſet off another point at the diſtance of the thick-

neſs

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neſs of the plank of the bottom, which is four inches and a half; and from this laſt-mentioned point draw a line upwards interſecting the perpendiculars at the height of the lower deck; then ſet up the perpendicular the height of the wing tranſom, and draw a level line, and where that line interſects, the line firſt drawn will be the aft ſide of the wing tranſom; on the upper part of the middle line ſet off from that place the diſtance of the aft ſide of the ſtern-poſt; ſet off alſo the diſtance of the after part from the rabbet on the upper edge of the the keel, and a line drawn through theſe two points will be the aft ſide of the poſt. A line drawn parallel to the firſt drawn line at the diſtance of four inches and a half, the thickneſs of the plank on the bottom, will be the aft ſide of the rabbet: and hence the ſtern-poſt is deſcribed, except the head, which will be determined afterwards.

From the dimenſions take the ſeveral heights of the upper deck above the gun-deck, afore, at midſhip, and abaft, and ſet them off accordingly; through theſe points deſcribe a curve, which will be the under ſide of the upper deck; deſcribe alſo another curve parallel thereto, at the diſtance of the thickneſs of the plank, and the upper deck will be then repreſented at the middle line of the ſhip.

Set off the height of the lower counter, at the middle line, from the upper edge of the keel, and draw a horizontal line with a pencil; then on the pencil line ſet off the diſtance the touch of the lower counter is abaft the aft ſide of the wing tranſom: from this point to that where the fore part of the rabbet of the ſtern-poſt interſects the line drawn for the upper part of the wing tranſom, draw a curve at pleaſure, which curve will repreſent the lower counter at the middle line. The height of the upper counter is then to be ſet off from the upper edge of the keel, and a horizontal line is to be drawn as before, ſetting off the diſtance the touch of the upper counter is abaft the aft ſide of the wing tranſom; and a curve deſcribed from thence to the touch of the lower counter will form the upper counter at the middle line.

Both counters being formed at the middle line, the upper part of the ſtern timber above the counters is to be deſcribed as follows: On the level line drawn for the upper ſide of the wing tranſom ſet off the diſtance of the aft ſide of the ſtern timber at the middle line from the aft ſide of the wing tranſom, at the height of the top-timber line, and erect a perpendicular: then upon this perpendicular, from the upper edge of the keel, ſet off the height at the middle line of the top-timber line at the after ſide of the ſtern timber; through this point draw a ſtraight line to the touch of the upper counter, and the upper part of the ſtern timber will be deſcribed.

As the ſtern rounds two ways, both up and aft, the ſtern timber at the ſide will conſequently alter from that at the middle line, and therefore remains to be repreſented. Take the round up of the upper counter from the dimenſions, and ſet it below the touch at the middle, and with a pencil draw a level line; take alſo the round aft, and ſet it forward from the touch on the touch line, and ſquare it down to the pencil line laſt drawn, and the point of interſection will be the touch of the upper counter at the ſide. In the ſame manner find the touch of the lower counter; and a curve, ſimilar to that at the middle line, being deſcribed from the one touch to the other, will form the upper counter at the ſide.

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Take the round up of the wing tranſom, and ſet it off below the line before drawn for the height of the wing tranſom, and draw another horizontal line in pencil: then take the round aft of the wing tranſom, and ſet it forward on the upper line from the point repreſenting the aft ſide of the wing tranſom; ſquare it down to the lower line, and the interſection will be the touch of the wing tranſom: then a curve, ſimilar to that at the middle line, being drawn from the touch of the wing tranſom to the touch of the lower counter at the ſide, will be the lower counter at the ſide. Draw a line from the upper counter upwards, and the whole ſtern timber at the ſide will be repreſented. But as the ſtraight line drawn for the upper part of the ſide timber ſhould not be parallel to that at the middle line, its rake is therefore to be determined as follows.

Draw a line at pleaſure, on which ſet off the breadth of the ſtern at the upper counter; at the middle of this line ſet off the round aft of the upper counter, then through this point and the extremities of the ſtern deſcribe a curve. Now take the breadth of the ſtern at the top-timber line, and through the point where that breadth will interſect the curve for the round aft of the ſtern draw a line parallel to that firſt drawn, and the diſtance from the line laſt drawn to the curve at the middle of the line is the diſtance that the ſide timber muſt be from the middle line at the height of the top-timber line.

The ſheer is to be deſcribed, which is done by ſetting off the heights afore, at midſhips, and abaft; and a curve deſcribed through theſe three points will be the ſheer. But in order that the ſheer may correſpond exactly with the dimenſions laid down, it will be neceſſary to proceed as follows: The perpendicular repreſenting timber dead flat being already drawn, ſet off from that the diſtances of the other frame timbers, which is double the room and ſpace, as the frames are only every other one; and erect perpendiculars, writing the name under each: then on each of theſe perpendiculars ſet off the correſponding heights of the top-timber line taken from the table of dimenſions for conſtructing the bodies; and through theſe points a curve being deſcribed, will repreſent the ſheer of the ſhip or top-timber line agreeable to the dimenſions.

The quarter-deck and forecaſtle are next to be deſcribed, which may be done by taking their reſpective heights and lengths from the dimenſions, and deſcribing their curves. In the ſame manner alſo, the round-houſe may be drawn. The decks being deſcribed repreſenting their heights at the middle, it is then neceſſary to repreſent them alſo at the ſide. For this purpoſe take the round of the decks from the dimenſions, and ſet them off below the lower line drawn for the middle; and a curve deſcribed both fore and aft, obſerving to let it be rather quicker than the former, will be the repreſentation of the decks at the ſide.

The ports come next under conſideration. In the placing of them due attention muſt be paid, ſo as to preſerve ſtrength; or that they ſhall be ſo diſpoſed as not to weaken the ſhip in the leaſt, which is often done by cutting off principal timbers, placing them in too large openings, having too ſhort timbers by the ſide of

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them, &c. The frames repreſented by the lines already drawn muſt be firſt conſulted. Then with a pencil draw two curves, for the lower and upper parts of the lower deck poſts, parallel to the line repreſenting the lower deck; the diſtances of theſe lines from the deck are to be taken from the dimenſions, obſerving, however, to add to theſe heights the thickneſs of the deck, as the deck line at the ſide repreſents the under part of the deck.

The foremoſt port is then to be deſcribed, obſerving to place it as far aft as to give ſufficient room for the manger: the moſt convenient place will therefore be to put it between the frames R and T, and equally diſtant from each. It will then be placed in the moſt conſpicuous point of ſtrength, as it will have a long top-timber on the aft ſide and a long fourth futtock on the fore ſide of it. The ſecond port may be placed in like manner between the next two frames, which will be be equally well ſituated for ſtrength as the former; and by proceeding in this manner, the ports on the gun deck may alſo be placed, taking care to have two frames between every two ports, all fore and aft.

The upper deck ports are then to be deſcribed; and in order to diſpoſe of them in the ſtrongeſt ſituation poſſible, they muſt be placed over the middle between the gun-deck ports, ſo that every frame in the ſhip will run up to the top of the ſide, by their coming between a gun and upper deck port; and every port will be between the frames, which will in a great meaſure contribute towards the ſtrength of the ſhip. With regard to the ports on the quarter deck, it is not of ſuch material conſequence if they cut the head of the frame, as in placing them the ſituation of the dead eyes muſt be conſidered, placing a port where there is a vacancy between the dead eyes large enough to admit of one; obſerving always to place them as nearly as poſſible at equal diſtances from each other; and where it happens that they do not fall in the wake of a frame, then that frame muſt by all means be carried up to the top of the ſide.

The neceſſary length of the round houſe being determined in the dimenſions, it may be ſet off; obſerving, however, to let it be no longer than is juſt ſufficient for the neceſſary accommodations, as the ſhorter the round-houſe the works abaft may be kept lower, and a low ſnug ſtern is always accounted the handſomeſt. Then ſet off the round of the deck at the foremoſt end, below the line drawn; the deck at the ſide may be deſcribed by another curve drawn quite aft. Now, from the point for the round of the deck to the ſtern-timber, draw a curve parallel to the top-timber line, and that will be the extreme height of the top of the ſide abaft, which height continues to range fair along to the foremoſt end of the round-houſe, and at that place may have a fall about 14 inches, which may be turned off with a drift ſcroll. At the fore part of the quarter-deck, the topſide may have a riſe of 14 inches, which may alſo be turned off with a ſcroll. But as the raiſing of the topſide only 14 inches at that place will not be ſufficient to unite with the heights abaft, it will therefore be neceſſary to raiſe 14 inches more upon that, and break it off with a ſcroll inverted on the firſt ſcroll, and continue theſe two lines, parallel to the top timber line, to the diſtance of about ſeven feet aft. At the foremoſt end of the round-houſe there is a break of 14 inches already mentioned; and in order to make that part uniform with the breaks at the foremoſt end of the quarter-deck, there muſt be ſet down 14 inches more below the former; and at theſe two heights continue two curves parallel to the top-timber line, from the aft part of the ſtern to the ends of the two curves already drawn at the foremoſt end of the quarter-deck. If they ſhould happen not to break in fair with them, they muſt be turned off with a round; but to make them appear more handſome, the lower line may be turned off with a ſcroll. Theſe lines being drawn will repreſent the upper edges of the rails.

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The height of the top ſide at the fore part of the ſhip muſt next be conſidered; which, in order to give proper height for the forecaſtle, muſt have a riſe there of 14 inches, the break being at the after end of the forecaſtle, and turned off as before. But as this part of the ſhip is ſtill conſiderably lower than the after part, it will be neceſſary to give another of eight inches upon the former, and turn it off with a ſcroll inverted. Hence this part of the ſhip will appear more uniform to the after part.

The finiſhing parts, namely the wales, ſtern, head, rails, &c. remain to be deſcribed. The wales may be firſt drawn; and as the ſtrength of the ſhip depends very much on the right placing of them, great care muſt therefore be taken that they may be as little as poſſible wounded by the lower deck ports, and ſo placed that the lower deck bolts ſhall bolt in them, and alſo that they come as near as poſſible on the broadeſt part of the ſhip. In the firſt place, therefore, the height of breadth lines muſt be choſen for our guide. Theſe heights of breadth are to be taken from the dimenſions, and ſet off on the reſpective frames, and curves drawn through theſe points will be the upper and lower heights of breadth lines. The height of the wales may be now determined; which in general is in ſuch a manner that the upper height of breadth line comes about ſix inches below their upper edge, and the wales are then placed right upon the breadth lines. Take the heights and breadths of the wales afore, at midſhips, and abaft, from the table of dimenſions; draw curves through the points thus found, and the wales will be repreſented.

The channel wales are then to be deſcribed. They are principally intended to ſtrengthen the top ſide, and muſt be placed between the lower and upper deck ports; and the lower end of them at midſhips ſhould be placed as low as poſſible, in order to prevent them from being cut by the upper deck ports afore and abaft. Take their heights and breadths from the dimenſions; lay them off, and deſcribe curves through the correſponding points, and the channel wales will be repreſented.

Lay off the dimenſions of the waſte rail found in the table; and through the points draw a line parallel to the top timber line all fore and aft. This rail terminates the lower part of the paint work on the top ſide, as all the work above this rail is generally painted, and the work of the top ſide below it payed with a varniſh, except the main wales, which are always payed with pitch.

Take the draught of water from the dimenſions, and draw the load water-line, which is always done in green. Divide the diſtance between the load water-line and the upper edge of the keel into five equal parts, and through theſe points draw four more water-lines.

Set

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Set off the centres of the maſts on the gun-deck; their rake may likewiſe be taken from the dimenſions. Set off alſo the centre of the bowſprit, letting it be four feet from the deck at the after part of the ſtem, which will give ſufficient height for a light and airy figure.

Draw the knight-heads ſo as to be ſufficiently high above the bowſprit to admit of a chock between them for the better ſecurity of the bowſprit. The timber heads may alſo be drawn above the forecaſtle, obſerving to place the moſt convenient for the timbers of the frame, being thoſe which come over the upper deck ports, as they may be allowed long enough to form handſome heads. There ſhould be one placed abaft the cat-head, to which the foremoſt block is to be bolted, and there may be two ports on the forecaſtle formed by them, and placed where it is moſt convenient to the dead eyes.

Deſcribe the channels, taking their lengths and thickneſſes from the dimenſions, and place their upper edges well with the lower edge of the ſheer rail. The dead eyes may then be drawn, obſerving to place them in ſuch a manner that the chains may not interfere with the ports; and the preventer plates muſt all be placed on the channel wales, letting them be of ſuch a length that the preventer bolt at each end may bolt on each edge of the channel wales. It muſt alſo be obſerved to give each of the chains and preventer plates a proper rake, that is, to let them lie in the direction of the ſhrouds, which may be done in the following manner: Produce the maſt upwards, upon which ſet off the length of the maſt to the lower part of the head; theſe ſtraight lines drawn from that point through the centre of each dead eye will give the direction of the chains and preventer braces.

The fenders may be then drawn, obſerving to place them right abreaſt of the main hatchway, in order to prevent the ſhip's ſide from being hurt by whatever may be hoiſted on board. The proper place for them will therefore be at timber 3; and the diſtance between them may be regulated by the diſtance between the ports. The cheſt tree may alſo be drawn, which muſt be placed at a proper diſtance abaft the foremaſt, for the conveniency of hauling home the fore tack. It may therefore be drawn at the aft ſide of timber C from the top of the ſide down to the upper edge of the channel wales; and the fenders may reach from the top of the ſide down to the upper edge of the main wales. As the fenders and cheſt-tree are on the outſide of the planks, wales, &c. the lines repreſenting the wales, &c. ſhould not be drawn through them.

Draw the ſteps on the ſide, which muſt be at the fore part of the main drift or break, making them as long as the diſtance between the upper and lower deck ports will admit of. They may be about ſix inches aſunder, and five inches deep, and continued from the top of the ſide down to the middle of the main wales.

In order to deſcribe the head, the height of the beak-head muſt be firſt determined, which may be about two feet above the upper deck. At that place draw a horizontal line, upon which ſet off the length of the beak-head, which may be 7½ feet abaft the fore part of the ſtem, and from thence ſquare a line up to the forecaſtle deck; which line will repreſent the aft part of the beak-head, and will likewiſe terminate the foremoſt end of the forecaſtle. The length of the head may now be determined, which by the proportions will be found to be 15 feet ſix inches from the fore part of the ſtem. Set it off from the fore part of the ſtem, and erect a perpendicular, which will be the utmoſt limits of the figure forward: then take the breadth of the figure from the proportions, which is four feet four inches, and ſet it off forward; and another perpendicular being drawn will ſhow the utmoſt extent of the hair bracket forward, or aft part of the figure. Then draw the lower cheek, letting the upper edge be well with the upper edge of the main wales, and the after end ranging well with the beak-head line; ſet off the depth of it on the ſtem; which is about 11 inches, and let a curved line paſs from the after end through the point on the ſtem, and to break in fair with the perpendicular firſt drawn for the length of the head, the fore part of the curve will then repreſent the poſition of the figure.

The upper cheek may next be drawn; but, in order to know the exact place of it on the ſtem, the place of the main rail muſt firſt be ſet off on the ſtem, the upper edge of which may be kept on a level with the beak-head; then ſetting off the depth of it below that, the place for the upper cheek may be determined, letting it be exactly in the middle between that and the lower cheek: then, by drawing curves for the upper and lower edges of the cheek from the after end parallel to the lower cheek, to break in fair with the perpendicular, drawn for the back of the figure: then the upper cheek will be formed. The upper part may run in a ſerpentine as high as where the ſhoulder of the figure is ſuppoſed to come, at which place it may be turned off with a ſcroll. The diſtance from the ſcroll to the heel of the figure is called the hair bracket.

The head of the block may be formed by continuing the line at the breaſt round to the top of the hair-bracket, obſerving to keep the top of it about ſix inches clear of the under ſide of the bowſprit.

Having the diſtance ſet off on the ſtem for placing the main rail, it may next be deſcribed, keeping the bag of it as level as poſſible for the conveniency of the gratings, and letting the foremoſt end riſe gradually according to the riſe of the upper cheek and hair bracket, and may turn off on the round of the ſcroll before drawn for the hair-bracket. To form the after end, ſet off the ſize of the head of the rail abaft the beak-head line, and erect a perpendicular; then deſcribe the arch of a circle from that perpendicular, to break in fair with the lower ſide of the rail in the middle, and alſo another from the beak-head perpendicular, to break in fair with the upper ſide of the rail at the middle, obſerving to continue the head of it ſufficiently high to range with the timber heads above the forecaſtle.

The head timbers are next to be drawn, placing the ſtem timber its own thickneſs abaft the ſtem, and the foremoſt muſt be ſo placed that the fore ſide may be up and down with the heel of the block or figure, which has not yet been ſet off. Take therefore the diſtance from the breaſt to the heel on a ſquare which is ſeven feet, and erect a perpendicular from the lower part of the lower cheek to the lower part of the upper cheek; which perpendicular will terminate the foremoſt end of the lower cheek and the heel of the figure, and will alſo terminate the lower end of the hair-bracket: then, by continuing the ſame perpendicular from the upper part of the

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the lower deck to the under part of the main-rail, the fore ſide of the foremoſt head timber will be deſcribed; and by ſetting off its thickneſs aft, the other ſide may be drawn. The middle head timber may be ſpaced between the two former ones; and there may alſo be one timber placed abaft the ſtem, at a diſtance from the ſtem, equal to that between the others, and the lower end of it may ſtep on the upper edge of the lower rail.

To deſcribe the middle and lower rails, divide the diſtance between the lower part of the main rail and the upper part of the upper cheek equally at every head timber; and curves being deſcribed through theſe points will form the middle and lower rails. The after end of the lower rail muſt terminate at the after edge of the after head timber.

The cat-head ought to be repreſented in ſuch a manner as to come againſt the aft ſide of the head of the main rail, to rake forward four inches in a foot, and to ſteeve up $5\frac{1}{2}$ inches in a foot, and about one foot ſix inches ſquare. The lower part of it comes on the plank of the deck at the ſide, and the ſupporter under it muſt form a fair curve to break in with the after end of the middle rail.

The hawſe holes muſt come between the cheeks, which is the moſt convenient place for them; but their place fore and aft cannot be exactly determined until they are laid down in the half-breadth plan.

The knee of the head is to project from the breaſt of the figure about two inches; and particular care muſt be taken that in forming it downwards it be not too full, as it is then liable to rub the cable very much: it may therefore have no more ſubſtance under the lower cheek at the heel of the figure than is juſt ſufficient to admit of the bobſtay holes, and may be $3\frac{1}{2}$ feet diſtant from the ſtem at the load water-line, making it run in an agreeable ſerpentine line from the breaſt down to the third water line, where it may be $1\frac{1}{4}$ feet from the ſtem. By continuing the ſame line downwards, keeping it more diſtant from the ſtem as it comes down, the *gripe* will be formed. The lower part of it muſt break in fair with the under part of the falſe keel; and the breadth of the gripe at the broadeſt place will be found by the proportions to be $4\frac{1}{2}$ feet. As the aft part of the gripe is terminated by the fore foot, or foremoſt end of the keel, it will now be proper to finiſh that part as follows: From the line repreſenting the upper edge of the keel ſet down the depth of the keel, through which draw a line parallel to the former, and it will be the lower edge of the keel. From that point, where the aft ſide of the ſtem is diſtant from the upper edge of the keel by a quantity equal to the breadth of the keel at midſhips, erect a perpendicular, which will limit the foremoſt end of the keel; and the after or lower end of the ſtem may be repreſented by ſetting off the length of the ſcarf from the foremoſt end of the keel, which may be ſix feet. Set down from the line repreſenting the lower edge of the keel the thickneſs of the falſe keel, which is ſeven inches; and a line drawn through that point parallel to the lower edge of the keel will be the under edge of the falſe keel, the foremoſt end of which may be three inches afore the foremoſt end of the main keel.

The head being now finiſhed, proceed next to the ſtern, the ſide and middle timbers of which are already drawn. From the ſide timber ſet off forward 14 feet, the length of gallery, and draw a pencil line parallel to the ſide timber; draw alſo a line to interſect the touch of the upper counter at the ſide, producing it forwards parallel to the ſheer as far as the pencil line firſt drawn; and this line will repreſent the upper edge of the gallery rim. From which ſet down eight inches, the breadth of the gallery rail, and draw the lower edge of the rail. At the diſtance of eight inches from the fore ſide of the ſide timber draw a line parallel thereto; and from the point of interſection of this line with the upper edge of the gallery rim, draw a curve to the middle timber parallel to the touches of the upper counter, which line will repreſent the upper edge of the upper counter rail as it appears on the ſheer draught. The lower edge of this rail may be formed by ſetting off its depth from the upper edge. In the ſame manner the lower counter rail may be deſcribed: then take the diſtance between that and the upper counter rail, and ſet it off below the rim rail; and hence the rail that comes to the lower ſtool may be drawn, keeping it parallel to the rim rail. Underneath that, the lower finiſhing may be formed, making it as light and agreeable as poſſible.

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Set off from the middle timber on the end of the quarter-deck the projection of the balcony, which may be about two feet, and draw a line with a pencil parallel to the middle timber. On this line ſet off a point $1\frac{1}{2}$ inches below the under ſide of the quarter-deck, from which draw a curve to the ſide timber parallel to the upper counter rail, which curve will repreſent the lower ſide of the foot ſpace rail of the balcony as it appears in the ſheer draught.

Take the diſtance between the point of interſection of the upper edge of the upper counter with the middle line, and the point of interſection of the under ſide of the foot ſpace rail with the middle line, which ſet up on a perpendicular from the upper edge of the rim rail at the foremoſt end. Through this point draw a line parallel to the rim rail to interſect the lower part of the foot ſpace rail, and this line will repreſent the lower edge of the rail that comes to the middle ſtool, and will anſwer to the foot ſpace rail. Then between this line and the rim rail three lights or faſhes may be drawn, having a muntin or pillar between each light of about 14 inches broad, and the lower gallery will be finiſhed. Set off the depth of the middle ſtool rail above the line already drawn for the lower edge, and the upper edge may be drawn. Then ſet off the ſame depth above the curve drawn for the lower edge of the foot ſpace rail, and the upper edge of that rail may then be drawn.

The quarter-piece muſt be next deſcribed, the heel of which muſt ſtep on the after end of the middle ſtool. Draw a line with a pencil parallel to the middle timber, and at a diſtance therefrom, equal to the projection of the balcony. Upon this line ſet up from the round-houſe deck the height of the upper part of the ſtern or taff rail, which may be four feet above the deck. At that height draw with a pencil a horizontal line, and from its interſection with the line firſt drawn deſcribe a curve to the middle ſtool rail, obſerving to make the lower part of this curve run nearly parallel to the ſide timber, and the lower part about three inches abaft the ſide timber; and this curve will repreſent the aft ſide of the quarter-piece at the outſide. There ſet off the thick-

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neſs of the quarter-piece, which is one foot ſix inches, afore the curve already drawn; and another curve being deſcribed parallel to it from the lower part to the top of the ſheer, and the quarter-piece at the outſide will be repreſented. On the horizontal line drawn for the upper part of the taff-rail ſet off forward the thickneſs of the taff-rail, which is one foot; then draw a curve down to the head of the quarter-piece parallel to the firſt, and that part of the taff-rail will be deſcribed. Inſtead of a fair curve, it is cuſtomary to form the upper part of the taff-rail with one or two breaks, and their curves inverted. Either way may, however, be uſed according to fancy.

Set off the depth of the taff-rail, which may be about $3\frac{1}{2}$ feet, on the line drawn for the projection; from the upper part, and from this point, deſcribe a curve as low as the heel of the quarter-piece, and about five inches abaft it at that place; obſerving to make it run nearly parallel to the after edge of the quarter-piece; and the after part of the quarter-piece, which comes neareſt to the ſide, will be repreſented.

Set up on the line drawn for the projection of the balcony the height of the upper part of the balcony or breaſt rail, which is $3\frac{1}{2}$ feet from the deck; ſet off the thickneſs of the rail below that, and deſcribe the balcony, keeping it parallel to the foot ſpace rail, and terminating it at the line drawn for the after part of the quarter-piece neareſt the ſide; and the whole balcony will then be repreſented.

The upper gallery is then to be deſcribed. In order to this, its length muſt be determined, which may be 11 feet. Set off this diſtance from the ſide timber forward with the ſheer; and at this point draw a line parallel to the ſide timber, which line will repreſent the fore part of the gallery. Then take the diſtance between the upper part of the foot ſpace rail and the upper part of the breaſt rail on a perpendicular, and ſet it off on a perpendicular from the upper part of the middle ſtool rail on the line drawn for the fore part of the gallery, from which to the fore part of the quarter-piece draw a ſtraight line parallel to the rail below, which line will be the upper edge of the upper rim rail; and its thickneſs being ſet off, the lower edge may alſo be drawn. From the upper edge of that rail ſet up an extent equal to the diſtance between the lower rim rail and middle ſtool rail, and deſcribe the upper ſtool rail, the after end of which will be determined by the quarter-piece, and the fore end by the line for the length of the gallery. There may be three faſhes drawn between theſe two rails as before; and hence the upper gallery will be formed.

The upper finiſhing ſhould be next drawn, the length of which may be $1\frac{1}{2}$ foot leſs than the upper gallery. Draw a line parallel to the rake of the ſtern for the fore end of it, and let the upper part of the top ſide be the upper part of the upper rail, from which ſet down three inches for the thickneſs of the rail, and deſcribe it. Deſcribe alſo another rail of the ſame length and thickneſs as the former, and eight inches below; from the end of which a ſerpentine line may be drawn down to the upper ſtool rail, and the upper finiſhing will be completed.

The ſtern being now finiſhed, the rudder only remains to be drawn. The breadth of the rudder at the lower part is to be determined from the proportions, and ſet off from the line repreſenting the aft part of the ſtern-poſt; which line alſo repreſents the fore part of the rudder. Then determine on the lower hance, letting it be no higher than is juſt ſufficient, which may be about one foot above the load water-line, and ſet off its breadth at that place taken from the proportions. Then a line draw from thence to the breadth ſet off at the lower part will be the aft ſide of the rudder below the lower hance. There may alſo be another hance about the height of the lower deck. The uſe of theſe breaks or hances is to reduce the breadth as it riſes toward the head. The aft part may be drawn above the lower hance, the break at the lower hance being about ten inches, and the break at the upper hance ſix inches.—The back may be then drawn. It is of elm, about four inches thick on the aft part. That thickneſs being ſet off, and a line drawn from the lower hance to the lower end, will repreſent the back. The head of the rudder ſhould be as high as to receive a tiller above the upper deck. Therefore ſet off the ſize of the head above the upper deck, and draw a line from thence to the break at the upper hance, and the aft part of the rudder will be repreſented all the way up. The bearding ſhould be drawn, by ſetting off the breadth of it at the keel from the fore ſide of the rudder, which may be nine inches. Set off alſo the breadth at the head of the wing tranſom, which may be a foot. Then a line being drawn through theſe two points, from the lower part of the rudder to about a foot above the wing tranſom, and the bearding will be repreſented. As the bearding is a very nice point, and the working of the rudder depending very much upon it, it ſhould always be very particularly conſidered. It has been cuſtomary to beard the rudder to a ſharp edge at the middle line, by which the main piece is reduced more than neceſſary. The rudder ſhould, however, be bearded from the ſide of the pintles, and the fore ſide made to the form of the pintles.

The pintles and braces may next be drawn. In order to which determine the place of the upper one, which muſt be ſo diſpoſed that the ſtraps ſhall come round the head of the ſtandard, which is againſt the head of the ſtern-poſt on the gun-deck, and meet at the middle line. By this means there is double ſecurity both to the brace and ſtandard. To obtain thoſe advantages, it muſt therefore be placed about four inches above the wing tranſom: the ſecond muſt be placed juſt below the gun-deck ſo as to bolt in the middle of the deck tranſom, and the reſt may be ſpaced equally between the lower one, which may be about ſix inches above the upper edge of the keel. The number of them is generally ſeven pair upon this claſs of ſhips; but the number may be regulated by the diſtance between the ſecond and upper one, making the diſtance between the reſt nearly the ſame. The length of all the braces will be found by ſetting off the length of the lower one, which may be eight feet afore the back of the ſtern-poſt, and alſo the length of the third, which is four feet and a half afore the back of the ſtern-poſt; and a line drawn from the one extremity to the other will limit the intermediate ones, as will appear on the ſheer draught. The braces will ſeem to diminiſh in length very much as they go up; but when meaſured or viewed on the ſhape of the body, they will be nearly of an equal length. The length of the ſtraps of the pintles which come

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come upon the rudder may all be within four inches of the aft side of the rudder; and the rudder being a flat surface, they will all appear of the proper lengths.

II. *Of the half-breadth and body plans.*—The half-breadth plan must be first drawn. Then produce the lower edge of the keel both ways, and let it also represent the middle line of the half-breadth plan. Produce all the frames downwards, and also the fore and after perpendiculars. Then from the place in the sheer-plan, where the height of breadth-lines intersect the stem, square down to the middle line the fore and aft part of the rabbet and the fore part of the stem. Take from the dimensions what the stem is sided at that place, and set off half of it from the middle line in the half-breadth plan, through which draw a line parallel to the middle line through the three lines squared down, and the half breadth of the stem will be represented in the half-breadth plan. Take the thickness of the plank of the bottom which is 4½ inches, and describe the rabbet of the stem in the half-breadth plan.

From the points of intersection of the height of breadth lines with the counter timber at the side, and with the counter timber at the middle line, draw lines perpendicular to the middle line of the half-breadth plan, from which set off the half breadth of the counter on the line first drawn; and from this point to the intersection of the line last drawn, with the middle line draw a curve, and the half breadth of the counter will be represented at the height of breadth, which will be the broadest part of the stern.

Take the main half breadth of timber dead flat from the dimensions, and lay it off from the middle line on dead flat in the half-breadth plan. Take also from the dimensions the main half breadth of every timber, and set off each from the middle line on the corresponding timbers in the half-breadth plan. Then a curve drawn from the end of the line representing the half breadth of the counter through all the points, set off on the timbers, and terminating at the aft part of the stern, will be the main half-breadth line. Take from the dimensions the top-timber half breadth, and describe the top-timber half-breadth line in the half-breadth plan, in the same manner as the main half-breadth line.

Take from the dimensions the half breadth of the rising, and set it off from the middle line on the corresponding timbers in the half-breadth plan, observing, where the word *outside* is expressed in the tables, the half breadth for that timber must be set off above or on the outside of the middle line. Then a curve drawn through these points will be the half breadth of rising in the half-breadth plan.

Plate CCCCXCII. Fig. 35.

It will now be necessary to proceed to the body plan. Draw a horizontal line (fig. 35.), which is called the *base line*, from the right hand extremity of which erect a perpendicular. Then set off on the base line the main half breadth at dead flat, and erect another perpendicular, and from that set off the main half breadth again, and erect a third perpendicular. The first perpendicular, as already observed, is called the side line of the fore body; the second the middle line; and the third the side line of the after body.

Take from the dimensions the heights of the diagonals up the middle line, and set them from the base up the middle line in the body plan. Take also their distances from the middle line on the base, and set them off. Set off also their heights up the side lines, and draw the diagonals. Then take from the sheer plan the heights of the lower height of breadth line, and set them off upon the middle line in the body plan; through these points lines are to be drawn parallel to the base, and terminating at the side lines. In like manner proceed with the upper height of breadth line.

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The rising is next to be set off on the body plan; it must, however, be first described in the sheer plan: Take, therefore, the heights from the dimensions, and set them off on the corresponding timbers in the sheer plan, and a curve described through these points will be the rising line in the sheer plan. Then take from the dimensions the rising heights of dead flat. Set it off in the body plan, and draw a horizontal line. Now take all the rising heights from the sheer plan, and set them off in the body plan from the line drawn for the rising height of dead flat, and draw horizontal lines through these points. Take from the half-breadth plan the half breadths of the rising, and set them off from the middle line in the body plan, and the centres of the floor sweeps of the corresponding timbers will be obtained.

From the half-breadth plan take the main half-breadth lines, and set them off from the middle line in the body plan on the corresponding lines before drawn for the lower height of breadth; and from the extremities of these lines set off towards the middle line the lengths of the lower breadth sweeps respectively.

Take from the dimensions the distance of each frame from the middle line on the diagonals, and set them off from the middle line on their respective diagonal lines. Now these distances being set off, and the lower breadth and floor sweeps described, the shape of the frames below the breadth line may easily be drawn as follows: Place one point of a compass in the distance set off for the length of the lower breadth sweep, and extend the other to the point which terminates the breadth, and describe an arch of a circle downwards, which will intersect the points set off on the upper diagonal lines, letting it pass as low as convenient. Then fix one point of the compasses in the centre of the floor sweep, and extend the other to the point set off on the fourth diagonal, which is the floor head; and describe a circle to intersect as many of the points set off on the diagonals as it will. Then draw a curve from the back of the lower breadth sweep, through the points on the diagonals, to the back of the floor sweep. Describe also another curve from the back of the floor sweep through the points on the lower diagonals, and terminating at the upper part of the rabbet of the keel, and that part of the frame below the breadth will be formed. In like manner describe the other frames.

Through the extremities of the frames at the lower height of breadth draw lines parallel to the middle line, and terminating at the upper height of breadth line, and from thence set off the upper breadth sweeps; now fix one point of the compass in the centres of the upper breadth sweeps successively, and the other point to the extremities of the frames, and describe circles upwards. Then from the sheer plan take off the heights of the top-timber lines, and set them off in the body plan, drawing horizontal lines; upon which set off the top-timber half breadths taken from the corresponding timbers

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bers in the half-breadth plan; and by deſcribing curves from the back of the upper breadth ſweeps through the points ſet off on the ſeventh or upper diagonal; and interſecting the top-timber half-breadths, the timbers will then be formed from the keel to the top of the ſide. The upper end of the timbers may be determined by taking the ſeveral heights of the upper part of the top ſide above the top-timber line, and ſetting them off above the top-timber line on the correſponding timbers in the body plan. The lower parts of the timbers are ended at the rabbet of the keel as follows: With an extent of four inches and a half, the thickneſs of the bottom, and one leg of the compaſſes at the place where the line for the thickneſs of the keel interſects the baſe line; with the other leg deſcribe an arch to interſect the keel line and the baſe. Then fix one point at the interſection of the arch and keel, and from the point of interſection of the keel and baſe deſcribe another arch to interſect the former. Then from the interſection of theſe arches draw one ſtraight line to the interſection of the keel and baſe, and another to the interſection of the lower arch and the keel, and the rabbet of the keel will be deſcribed at the main frame. All the timbers in the middle part of the ſhip which have no riſing terminate at the interſection of the upper edge of the rabbet with the baſe line; but the lower part of the timbers, having a riſing, end in the centre of the rabbet, that is, where the two circles interſect. Thoſe timbers which are near the after end of the keel muſt be ended by ſetting off the half breadth of the keel at the port in the half-breadth plan, and deſcribe the tapering of the keel. Then at the correſponding timbers take off the half breadth of the keel; ſet it off in the body plan, and deſcribe the rabbet as before, letting every timber end where the two circles for its reſpective rabbet interſect.

To deſcribe the ſide counter or ſtern timber, take the height of the wing tranſom, the lower counter, upper counter, and top-timber line at the ſide; from the ſheer plan transfer them to the body plan, and through theſe points draw horizontal lines. Divide the diſtance between the wing tranſom and lower counter into three equal parts, and through the two points of diviſion draw two horizontal lines. Draw alſo a horizontal line equidiſtant from the upper counter and the top-timber line in the ſheer plan, and transfer them to the body plan.

Now, from the point of interſection of the aft ſide of the ſtern timber at the ſide, with the wing tranſom at the ſide in the ſheer plan, draw a line perpendicular to the middle line in the half-breadth plan. Draw alſo perpendicular lines from the points where the upper and lower tranſoms touch the ſtern-poſt; from the points of interſection of the ſtern timber with the two horizontal lines drawn between, and from the interſection of the ſtern timber with the horizontal line drawn between the upper counter and top-timber line. Then curves muſt be formed in the half-breadth plan for the ſhape of the body at each of theſe heights. In order to which, begin with the horizontal or level line repreſenting the height of the wing tranſom in the body plan. Lay a ſlip of paper to that line, and mark on it the middle line and the timbers 37, 35, 33, and 29; transfer the ſlip to the half-breadth plan, placing the point marked on it for the middle line exactly on the middle in the half-breadth plan, and ſet off the half breadths on the correſponding timbers 37, 35, 33, and 29, and deſcribe a curve through theſe points, and to interſect the perpendicular drawn from the ſheer plan. In like manner proceed with the horizontal lines at the heights of the counters, between the lower counter and wing tranſom, above the upper counter and top-timber line; and from the interſections of the curve drawn in the half-breadth plan, with the perpendicular lines drawn from the ſheer plan, take the diſtances to the middle line, and ſet them off on the correſponding lines in the body plan; then a curve deſcribed through the ſeveral points thus ſet off will be the repreſentative of the ſtern timber.

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The round-up of the wing tranſom, upper and lower counter, may be taken from the ſheer draught, and ſet off at the middle line above their reſpective level lines in the body plan, by which the round-up of each may be drawn. The round aft of the wing tranſom may alſo be taken from the ſheer plan, and ſet off at the middle line, abaft the perpendicular for the wing tranſom in the half-breadth plan, whence the round aft of the wing tranſom may be deſcribed.

The after body being now finiſhed, it remains to form the fore body; but as the operation is nearly the ſame in both, a repetition is therefore unneceſſary, except in thoſe parts which require a different proceſs.

The foremoſt timbers end on the ſtem, and conſequently the method of deſcribing the ending of them differs from that uſed for the timbers uſed in the after body. Draw a line in the body plan parallel to the middle line, at a diſtance equal to the half of what the ſtem is ſided. In the ſheer plan take the height of the point of interſection of the lower part of the rabbet of the ſtem with the timber which is required to be ended, and ſet it off on the line before drawn in the body plan. Then take the extent between the points of interſection of the timber with the lower and upper parts of the rabbet, and with one leg of the compaſſes at the extremity of the diſtance laid off in the body plan deſcribe a circle, and the timbers may then paſs over the back of this circle. Now, by applying a ſmall ſquare to the timber, and letting the back of it interſect the point ſet off for the lower part of the rabbet, the lower part of the rabbet and the ending of the timbers will be deſcribed.

The foremoſt timbers differ alſo very much at the head from thoſe in the after body: For ſince the ſhip carries her breadth ſo far forward at the top-timber line, it therefore occaſions the two foremoſt frames to fall out at the head beyond the breadth, whence they are called *knuckle* timbers. They are thus deſcribed: The height of the top-timber line being ſet off in the body plan, ſet off on it the top half breadth taken from the half-breadth plan, and at that place draw a perpendicular; then from the ſheer plan take the height of the top of the ſide, and ſet it off on the perpendicular in the body plan: Take alſo the breadth of the rail at the top-timber line in the ſheer plan, and ſet it off below the top-timber line at the perpendicular line in the body plan, and the ſtraight part of the knuckle timber to be drawn will be determined. Then from the laſt-mentioned point ſet off deſcribe a curve through the points ſet off for the timber down to the upper breadth, and the whole knuckle timber will be formed. It will

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hence be ſeen that thoſe timbers forward will fall out beyond the main breadth with a hollow, contrary to the reſt of the top ſide, which falls within the main breadth with a hollow.

The fore and after bodies being now formed, the water lines muſt next be deſcribed in the half-breadth plan, in order to prove the fairneſs of the bodies. In this draught the water lines are all repreſented parallel to the keel; their heights may, therefore, be taken from the ſheer plan, and transferred to the body plan, drawing horizontal lines, and the water lines will be repreſented in the body plan. In ſhips that draw more water abaft than afore, the water lines will not be parallel to the keel; in this caſe, the heights muſt be taken at every timber in the ſheer plan, and ſet off on their correſponding timbers in the body plan; and curves being deſcribed through the ſeveral points, will repreſent the water lines in the body plan.

Take the diſtances from the middle line to the points where the water lines interſect the different timbers in the body plan, and ſet them off on their correſponding timbers in the half-breadth plan. From the points where the water lines in the ſheer plan interſect the aft part of the rabbet of the ſternpoſt draw perpendiculars to the middle line of the half-breadth plan, and upon theſe perpendiculars ſet off from the middle line the half thickneſs of the ſternpoſt at its correſponding water line; which may be taken from the body plan, by ſetting off the ſize of the poſt at the head and the keel, and drawing a line for the tapering of it; and where the line ſo drawn interſects the water lines, that will be the half thickneſs required: then take an extent in the compaſſes equal to the thickneſs of the plank, and fix one point where the half thickneſs of the poſt interſects the perpendicular, and with the other deſcribe a circle, from the back of which the water lines may paſs through their reſpective points ſet off, and end at the fore part of the half-breadth plan, proceeding in the ſame manner as with the after part. A line drawn from the water line to the point ſet off for the half thickneſs of the poſt will repreſent the aft part of the rabbet of the poſt; and in like manner the rabbet of the ſtem may be repreſented. The water lines being all deſcribed, it will be ſeen if the body is fair; and if the timbers require any alteration, it ſhould be complied with.

The cant-timbers of the after body may next be deſcribed in the half-breadth plan; in order to which the cant of the faſhion-piece muſt firſt be repreſented. Having therefore the round aft of the wing tranſom repreſented in the half-breadth plan, and alſo the ſhape of a level line at the height of the wing tranſom; then ſet off the breadth of the wing tranſom at the end, which is one foot four inches, and that will be the place where the head of the faſhion-piece will come: now to determine the cant of it, the ſhape of the body muſt be conſidered; as it muſt be canted in ſuch a manner as to preſerve as great a ſtraightneſs as is poſſible for the ſhape of the timber, by which means the timber will be much ſtronger than if it were crooked; the cant muſt alſo be conſidered, in order to let the timber have as little bevelling as poſſible. Let, therefore, the heel of the timber be ſet off on the middle line, two feet afore timber 35; and then drawing a line from thence to the point ſet off on the level line for the wing tranſom, the cant of the faſhion-piece will be deſcribed, and will be found ſituated in the beſt manner poſſible to anſwer the before mentioned purpoſes.

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The cant of the faſhion-piece being repreſented, the cant of the other timbers may now be eaſily determined. Let timber 29 be the foremoſt cant timber in the after body, and with a pencil draw timber 28; then obſerve how many frames there are between timber 28 and the faſhion-piece, which will be found to be nine, namely, 29, 30, 31, 32, 33, 34, 35, 36, and 37. Now divide the diſtance between timber 28 and the faſhion-piece on the middle line into 10 equal parts: Divide alſo the correſponding portion of the main half-breadth lines into the ſame number of equal parts; and ſtraight lines joining the correſponding points at the middle line with thoſe in the half-breadth line will repreſent the cant timbers in the after body.

The line drawn for the cant of the faſhion-piece repreſents the aft ſide of it, which comes to the end of the tranſoms; but in order to help the converſion with regard to the lower tranſoms, there may be two more faſhion-pieces abaft the former; therefore the foremoſt faſhion-piece, or that which is already deſcribed in the half-breadth plan, may only take the ends of the three upper tranſoms, which are, the wing, filling, and deck: the middle faſhion-piece may take the four next, and the after faſhion-piece the lower ones: therefore ſet off in the half-breadth plan the ſiding of the middle and after faſhion-piece, which may be 13 inches each; then by drawing lines parallel to the foremoſt faſhion-piece, at the aforeſaid diſtance from each other, the middle and after faſhion-piece will be repreſented in the half-breadth plan.

The faſhion-piece and tranſoms yet remain to be repreſented in the ſheer plan; in order to which, let the number of tranſoms be determined, which, for ſo large a buttock, may be ſeven below the deck tranſom: draw them with a pencil, beginning with the wing, the upper ſide of which is repreſented by a level line at its height; ſet off its ſiding below that, and draw a level line for the lower edge. The filling tranſom follows; which is merely for the purpoſe of filling the vacancy between the under edge of the wing and the upper part of the deck plank: it may therefore be repreſented by drawing two level lines for the upper and lower edge, leaving about two inches between the upper edge and lower edge of the wing tranſom, and four inches between the lower edge of the gun-deck plank; then the deck tranſom muſt be governed by the gun-deck, letting the under ſide of the gun-deck plank repreſent the upper ſide of it, and ſetting off its ſiding below that; the under edge may alſo be drawn: the tranſoms below the deck may all be ſided equally, which may be 11 inches; they muſt alſo have a ſufficient diſtance between to admit the circulation of the air to preſerve them, which may be about three inches.

The tranſoms being now drawn with a pencil, the faſhion-piece muſt next be deſcribed in the ſheer plan, by which the length of the tranſoms as they appear in that plan will be determined. As the foremoſt faſhion-piece reaches above the upper tranſom, it may therefore be firſt deſcribed: in order to which, draw a ſufficient number of level lines in the ſheer plan; or, as the water lines are level, draw therefore one line between the upper water line and the wing tranſom, and one above the

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the wing tranſom at the intended height of the head of the faſhion-piece, which may be about five feet: then take the height of theſe two level lines, and transfer them to the body plan; and take off two or three timbers and run them in the half-breadth plan, in the ſame manner as the water lines were done; then from the point where the line drawn for the cant of the faſhion-piece, in the half-breadth plan, interſects the level line drawn for the head of the faſhion-piece, draw up a perpendicular to the ſaid line in the ſheer plan, making a point. Again, from the interſection of the cant line, with the level line for the wing tranſom in the half-breadth plan, draw a perpendicular to the wing tranſom in the ſheer plan. Alſo draw perpendiculars from the points where the cant line in the half-breadth plan interſects the level line below the wing tranſom, and alſo the water lines to the correſponding lines in the ſheer plan; then a curve deſcribed through theſe points will be the repreſentation of the foremoſt faſhion-piece in the ſheer plan. In the ſame manner the middle and after faſhion-pieces may be deſcribed; obſerving to let the middle one run up no higher than the under part of the deck tranſom, and the after to the under ſide of the fourth tranſom under the deck. The tranſoms may now be drawn with ink, as their lengths are limited by the faſhion-pieces.

Neither the head nor the foreſide of the ſternpoſt are yet deſcribed; take, therefore, from the dimenſions, the breadth of the poſt on the keel, and ſet it off on the upper edge of the keel from the aft ſide of poſt. The head of the poſt muſt next be determined, which muſt juſt be high enough to admit of the helm-poſt tranſom and the tiller coming between it and the upper deck beam; the height therefore that is neceſſary will be one foot nine inches above the wing tranſom. Now draw a level line at that height, upon which ſet off the breadth of the ſternpoſt at that place, taken from the dimenſions, and a line drawn from thence to the point ſet off on the keel will be the foreſide of the ſternpoſt; obſerving, however, not to draw the line through the tranſoms, as it will only appear between them. The inner poſt may be drawn, by ſetting off its thickneſs forward from the ſternpoſt, and drawing a ſtraight line as before, continuing it no higher than the under ſide of the wing tranſom.

The cant timbers in the after body being deſcribed, together with the parts dependent on them, thoſe in the fore body may be next formed; in order to which, the foremoſt and aftermoſt cant timbers muſt be firſt determined, and alſo the cant of the foremoſt ones. The foremoſt cant timber will extend ſo far forward as to be named &; the cant on the middle line may be one foot four inches afore ſquare timber W, and on the main half breadth line one foot nine inches afore timber Y; in which ſituation the line may be drawn for the cant; the aftermoſt may be timber Q. The cant timbers may now be deſcribed in the ſame manner as thoſe in the after body, namely, by ſpacing them equally between the cant timber & and the ſquare timber P, both on the main half-breadth, and middle lines, and drawing ſtraight lines between the correſponding points, obſerving to let them run out to the top-timber half-breadth line, where it comes without the main half-breadth line.

The hawſe pieces muſt next be laid down in the half-breadth plan; the ſides of which muſt look fore and aft with the ſhip upon account of the round of the bow. Take the ſiding of the apron, which may be about four inches more than the ſtem, and ſet off half of it from the middle line, drawing a line from the main half-breadth to the foremoſt cant timber, which will repreſent the foremoſt edge of the knight-head; then from that ſet off the ſiding of the knight-head, which may be one foot four inches, and draw the aft ſide of it. The hawſe pieces may then be drawn, which are four in number, by ſetting off their ſidings, namely, one foot ſix inches parallel from the knight-head and from each other; and ſtraight lines being drawn from the main half-breadth line to the foremoſt cant timber will repreſent them.

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The hawſe holes ſhould be deſcribed in ſuch a manner as to wound the hawſe pieces as little as poſſible; they may therefore be placed ſo that the joint of the hawſe pieces ſhall be in the centre of the holes, whence they will only cut half the hawſe pieces. Take the dimenſions of the hawſe holes, which is one foot ſix inches, and ſet off the foremoſt one, or that next the middle line, on the joint between the firſt and ſecond hawſe piece; then ſet off the other on the joint between the third and fourth hawſe piece; and ſmall lines being drawn acroſs the main half-breadth at their reſpective places will repreſent the hawſe holes in the half-breadth plan.

The hawſe holes ſhould next be repreſented in the ſheer plan. In this claſs of ſhips they are always placed in the middle between the cheeks; therefore ſet off their diameter, namely, one foot ſix inches, between the cheeks, and draw lines parallel to the cheeks for their upper and lower part. Then to determine their ſituation agreeable to the half-breadth plan, which is the fore and aft way, draw perpendiculars from their interſections with the main half-breadth line to the lines drawn between the cheeks, and their true ſituations, the fore and aft way, will be obtained; and, by deſcribing them round or circular, according to the points ſet off, they will be repreſented as they appear in the ſheer plan.

The apron may be drawn in the ſheer plan, ſetting off its bigneſs from the ſtem, and letting it come ſo low that the ſcarf may be about two feet higher than the foremoſt end of the fore foot; by which it will give ſhip to the ſcarfs of the ſtem. It may run up to the head of the ſtem.

The cutting down ſhould next be drawn. Take therefore from the tables of dimenſions the different heights there expreſſed, and ſet them off from the upper edge of the keel on the correſponding timbers in the ſheer plan: then a curve deſcribed through the points ſet off, from the inner poſt aft to the apron forward, will be the cutting down. Next ſet off from the cutting down the thickneſs of the timber ſtrake, which is eight inches and a half, and a curve deſcribed parallel to the former will repreſent the timber ſtrake, from which the depth of the hold is always meaſured.

The kelſon is drawn, by taking its depth from the dimenſions, and ſet it off above the cutting down line; and a curve deſcribed parallel to the cutting down will repreſent the kelſon.

The cutting down line being deſcribed, the knee of the dead wood abaft timber 27, being the after floor timber, may then be repreſented. Set off the ſiding of the floor abaft it, and erect a perpendicular in the ſheer plan, which will terminate the foremoſt end of

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the dead wood: then the fore and aft arm of the knee may be half the length of the whole dead wood, and the up and down arm may reach to the under part of the lower tranſom; and the whole knee may be placed in ſuch a manner that the upper piece of the dead wood ſhall bolt over it, and be of as much ſubſtance as the knee itſelf: therefore the knee muſt conſequently be placed its whole thickneſs below the cutting down line repreſenting the upper part of the dead wood.

The ſheer draught, the body, and half-breadth pl are now finiſhed, from whence the ſhip may be laid down in the mould loft, and alſo the whole frame erected. As, however, the uſe of the diagonal lines in the body plan has not been ſufficiently explained, it is therefore thought proper to ſubjoin the following illuſtration of them.

45 Nature and uſe of diagonal lines.

The diagonal lines in the body plan are mentioned in the tables of dimenſions merely for the purpoſe of forming the body therefrom; but after the body is formed, they are of very principal uſe, as at their ſtations the ribbands and harpins which keep the body of the ſhip together while in her frames are all deſcribed, and the heads of the different timbers in the frame likewiſe determined.

The lowermoſt diagonal, or N° 1. which is named the *lower firmark*, at which place the bevellings are taken for the hollow of the floors; its ſituation is generally in the middle between the keel and the floor firmark.

Second diagonal is placed in the midſhips, about 18 inches below the floor head, and is the ſtation where the floor ribband is placed in midſhips, and likewiſe the floor harpin forward; there is alſo a bevelling taken at this diagonal all the way fore and aft, from which it is termed the *floor firmark*.

Third diagonal, terminates the length of the floors, and is therefore called the *floor head*. There are likewiſe bevellings taken at this diagonal as far forward and aft as the floor extends. The placing of this diagonal is of the utmoſt conſequence to the ſtrength of the ſhip, it being ſo near to that part of the bulge which takes the ground, and of conſequence is always liable to the greateſt ſtrain: it ſhould therefore be placed as much above the bearing of the body in midſhips as could be conveniently allowed by converſion of the timber; but afore and abaft it is not of ſo much conſequence.

Fourth diagonal is placed in the middle between the floor head and the fifth diagonal, at which place a ribband and harpin are ſtationed for the ſecurity of the firſt or lower futtock, from whence it is named the *firſt futtock firmark*. There are alſo bevellings taken at this diagonal all afore and aft, which being part of the body where the timbers moſt vary, occaſions them to be the greateſt bevellings in the whole body.

Fifth diagonal terminates the heads of the firſt futtocks, and is therefore called the *firſt futtock head*. It ſhould be placed at a convenient diſtance above the floor head, in order to give a ſufficient ſcarf to the lower part of the ſecond futtocks. There are likewiſe bevellings for the timbers taken at this diagonal, all fore and aft.

Sixth diagonal ſhould be placed in the middle between the firſt futtock head and the ſeventh diagonal; at which place the ribband and harpin are ſtationed for the ſupport of the ſecond futtocks. Bevellings are taken at this diagonal all fore and aft. It is named the *ſecond futtock firmark*.

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Seventh diagonal terminates the ſecond futtock heads from the fore to the aftermoſt floors, and afore and abaft them it terminates the double futtock heads in the fore and aft cant bodies. It ſhould be placed in midſhips, as much above the firſt futtock head as the firſt futtock is above the floor head: by which it gives the ſame ſcarf to the lower part of the third futtock as the firſt futtock does to the ſecond. There are bevellings taken all fore and aft at this diagonal. It is named the *ſecond futtock head*.

Eighth diagonal is the ſtation for the ribband and harpin which ſupports the third futtocks, and is therefore placed between the ſecond futtock head and ninth diagonal. It is alſo a bevelling place, and is named the *third futtock firmark*.

Ninth and laſt diagonal is placed the ſame diſtance above the ſecond futtock head as that is above the firſt, and terminates all the heads of the third futtocks which are in the frames, as they come between the ports; but ſuch as are between the frames, and come under the lower deck ports, muſt run up to the under part of the ports, as no ſhort timbers ſhould by any means be admitted under the ports, which require the greateſt poſſible ſtrength. This diagonal is likewiſe a bevelling place for the heads of the third futtocks, and is therefore called the *third futtock head*.

The fourth futtock heads are terminated by the under part of the upper deck ports all fore and aft, and a ribband is placed fore and aft at the height of the upper breadth line, another between the lower and upper deck ports, and one at the top-timber line; which, with the ribbands and harpins before mentioned, keep the whole body of the ſhip together, and likewiſe in its proper form and ſhape.

It muſt be obſerved, that the diagonal lines laid down in the dimenſions will not correſpond to what has been ſaid above upon diagonals, as they were drawn diſcretionally upon the body for the purpoſe of giving the true dimenſions of it. Therefore, when the body is drawn in fair, the firſt diagonals (which ſhould only be in pencil) are to be rubbed out, and the proper diagonals drawn with red ink, ſtrictly adhering to what has been ſaid above.

SECT. III. *Of the Inboard Works of the Ship deſcribed in the preceding Section.*

DRAUGHTS of the outboard works being now conſtructed, in which every part is deſcribed that is neceſſary to enable the artiſt to put the ſhip in her frames, we muſt now proceed to form another draught of the cavity of the ſhip or inboard works, which muſt be ſo contrived that every thing within the ſhip may be arranged in the moſt commodious manner and to the beſt advantage.

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It is uſual to draw the inboard works in the ſheer-draught; but as this generally occaſions much confuſion, it is therefore the beſt and eaſieſt method to appropriate a draught to this particular purpoſe.

Take from the ſheer-draught the ſtem, ſtern-poſt, counter timbers, and keel, and deſcribe them on another paper; draw in alſo the cutting down, kelſon, apron, tranſoms, faſhion-pieces, and decks, and the upper line of the ſheer all fore and aft, alſo paſs the timbers and ports.

The

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The beams come firſt under conſideration, and ſhould be ſo diſpoſed as to come one under and one between each port, or as near as can be to anſwer other works of the ſhip; but where it happens that a beam cannot poſſibly be placed under the port, then a beam arm ſhould be introduced to make good the deficiency. Every beam, and alſo the beam arms, ſhould be kneed at each end with one lodging and one hanging knee; and in thoſe parts of the ſhip which require the knees to be very acute, ſuch as the after beams of the gun-deck, and in ſome ſhips, whoſe bodies are very ſharp, the foremoſt beams of the gun-deck, there ſhould be knees of iron. Care ſhould be taken always to let the upper ſide of the knees be below the ſurface of the beams, in large ſhips one inch and a half, and in ſmall ſhips an inch, by which means the air will have a free paſſage between the knees and under part of the deck.

In the converſion of the beams the ſide next the lodging knee ſhould be left as broad at the end of the beam as can poſſibly be allowed by the timber, the beam retaining its proper ſcantling at the end of the lodging knee: by ſo doing the lodging knees will be more without a ſquare, which conſequently makes them the more eaſy to be provided.

In ſhips where the beams can be got in one piece, they ſhould be ſo diſpoſed as to have every other one with the butt end the ſame way; for this reaſon, that the butts will decay before the tops. In large ſhips the beams are made in two or three pieces, and are therefore allowed to be ſtronger than thoſe that are in one piece. The beams in two pieces may have the ſcarf one-third of the length, and thoſe in three pieces ſhould have the middle piece half the length of the whole beam. The cuſtomary way of putting them together is to table them; and the length of the tablings ſhould be one-half more than the depth of the beam. It is very common to divide the tablings in the middle of the beam, and that part which is taken out at the upper ſide to be left at the lower ſide, and then kerſey or flannel is put into the ſcarf: but in this caſe the water is liable to lie in the ſcarf, and muſt be the means of rotting the beams. If, however, the beams were tabled together in dovetails, and taken through from ſide to ſide, putting tar only between them, which hardens the wood; then the water occaſioned by the leaking of the decks would have a free paſſage, and the beam would dry again; and this method would not be found inferior in point of ſtrength to the other. The length of the fore and aft arm of the lodging knee ſhould extend to the ſide of the hanging knee next to it; but there is no neceſſity for that arm to be longer than the other. In faſtening the knees, care would be taken to let one bolt paſs exactly through the middle of the throat, one foot ſix inches from each end, and the reſt divided equally between; obſerving always to have the holes bored ſquare from the knee. The bolts for the thwartſhip arms of both hanging and lodging knees may go through the arms of each knee, and drive every one the other way.

In order to draw the beams in the draught, take the moulding of the lower deck beams, and ſet if off below the line repreſenting the deck at the ſide, and draw a line in pencil parallel thereto, which will repreſent the under ſide of the beams. In like manner repreſent the under ſide of the beams for the upper deck, quarter deck, forecaſtle, and roundhouſe. Then take the ſiding of the lower deck beams, and place one under and one between each port, all fore and aft, drawing them in pencil. Determine the dimenſions of the well fore and aft, which is ten feet, and ſet it off abaft the beam under the eighth port, placing the beam under the ninth port at that diſtance: thoſe two beams may then be drawn in ink, and will terminate the extent of the well the fore and aft way; and as a beam cannot go acroſs the ſhip at that place upon account of its being the well and maſt room, there muſt therefore be a beam arm between theſe two beams.

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The main hatchway ſhould then be determined, letting the beam that forms the fore part of the well form the aft part of it, and the beam under the next part may form the fore ſide of it, which beam may alſo be now drawn in ink: there ſhould alſo be another beam arm introduced in the wake of the main hatchway.

The fore hatchway may be next determined; the fore ſide of which ſhould range well up and down with the after end of the forecaſtle, and it may be fore and aft about four-ſevenths of the main hatchway. At the foreſide of the fore hatchway there muſt be a ladderway down to the orlop, which may be as much fore and aft as the beams will allow. The reſt of the beams afore the fore hatchway may remain as firſt placed, there being nothing in the way to alter the ſhip. Then determine on the after hatchway, the foreſide of which comes to the aft ſide of the mainmaſt room.

There ſhould alſo be a hatchway, the foreſide of which may be formed by the aft ſide of the beam under the twelfth port; which is for the conveniency of the ſpirit and fiſh rooms: and there ſhould be a ladderway abaft it to lead down to the cockpit. There may be alſo another hatchway, the foreſide of it to be formed by the aft ſide of the beam under the eleventh port. The ſize of the ladder and hatchways muſt be governed by the beams, as when there is a good ſhift of beams they ſhould not be altered for ladder and hatchways, unleſs it is the three principal hatchways, which muſt always be of a proper ſize, according to the ſize of the ſhip.

The after capſtan muſt be placed between the two hatchways laſt deſcribed, and the beams abaft may ſtand as they are already ſhifted, obſerving only the mizenmaſt. There ſhould be a ſmall ſcuttle placed afore the ſecond beam from aft, for the convenience of the bread room: it muſt be on one ſide of the middle lines, as there is a carling at the middle under the four or five after beams to receive the pillars for the ſupport thereof.

The bits may be placed, letting the foreſide of the after ones come againſt the aft ſide of the beam abaft the third port, and the foreſide of the foremoſt ones againſt the next beam but one forward; then at the foreſide of each bit there ſhould be drawn a ſmall ſcuttle for the conveniency of handing up the powder from the magazine. The breaſt hook ſhould alſo be drawn, which may be three feet the moulding away, and ſided nine-tenths of the beams of the lower deck.

The gun-deck, beams, knees, &c. being deſcribed; in which, as well as all the decks having ports, the ſame precautions are to be uſed as in the gun-deck; and obſerving

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ſerving to keep the beams upon one deck as nearly as poſſible over the beams of the other, for the conveniency of pillaring, as they will then ſupport each other.

The hatchways are to be placed exactly over thoſe on the lower deck, each over each; and therefore, where there is a beam arm in the lower deck there muſt alſo be one above it in the upper deck, and the ſame in the middle deck in three-deck ſhips. It commonly happens in ſhips of the line that there cannot be a whole beam between the deck breaſt hook and the beam that ſupports the ſtep of the bowſprit, becauſe the bowſprit paſſes through that place: in this caſe, there muſt be a beam arm placed, letting the end come equally between the beam and the breaſt hook: but in ſhips that the bowſprit will allow of a whole beam, then the ports and the reſt of the beams muſt be conſulted in order to ſpace it; and when it ſo happens that the fore maſt comes in the wake of a port, then a beam arm muſt be neceſſarily introduced.

Having placed the beams according to the diſpoſition of the other beams below, the ladderways ſhould be contrived: there ſhould be one next abaft the fore hatchway, which is a ſingle ladderway, and one next afore the main hatch, which is a double ladderway; the ladders ſtanding the fore and aft way. There ſhould alſo be another next abaft the after hatch, and one over the cockpit correſponding with that on the lower deck.

The capſtans are next to be conſidered; the after one is already placed on the lower deck, the barrel of which muſt paſs through the upper deck to receive the whelps and drumhead there, it being a double capſtan. In ſhips having three decks, the upper part of each capſtan is in the middle deck; but in ſhips with one deck there is only this one capſtan, the upper part of which is placed on the quarter deck. The foremoſt capſtan ſhould be placed in the moſt convenient ſpot, to admit of its being lowered down to the orlop out of the way of the long boat: it may therefore be placed between the main and fore hatchways; the beam under the ſixth port of the lower deck may form the aft ſide of its room, and the beams on each ſide of it ſhould be placed exactly over or under the beams on the other decks, and they ſhould be at a diſtance from each other ſufficient to let the drumheads paſs between them. The centre of the capſtan ſhould then be placed in the middle between the beams which compoſe its room; and the partners ſhould be fitted in ſuch a manner as to ſhift occaſionally when wanted, which is by letting them be in two pieces fitted together. The partners on the lower deck, wherein the capſtan ſteps, muſt be ſupported by a pillar on the orlop deck, the lower part of which may be fitted in an oak chock; ſo that when the pillar is taken away, and the capſtan lowered down, that chock ſerves as a ſtep for the capſtan. Theſe two beams on the orlop, by having the pillar and chock upon them, have therefore the whole weight of the capſtan preſſing downwards: for the ſupport of them, there ſhould be a carling placed underneath the fore and aft way, with three pillars, one under each beam, and one between; all of them being ſtept in the kelſon, by which the orlop deck will be well ſupported in the wake of the capſtan, and the other decks will feel no ſtrain from it.

The fire hearth is next to be diſpoſed; which is placed differently according to the ſize of the ſhip. In three-deckers it is found moſt convenient to place it on the middle deck; whence there is much more room under the forecaſtle than there would have been had it been placed there. In all two-deck ſhips it is placed under the forecaſtle, becauſe on the deck underneath the bits are in the way. It is alſo under the forecaſtle in one-deck ſhips, though confined between the bits: in this caſe it ſhould be kept as near as poſſible to the after bits, that there may be more room between it and the foremoſt bits to make a good galley.

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The poſitions of the main-topſail-ſheet bits are next to be determined; the foremoſt of which muſt be ſo placed as to let its foreſide come againſt the aft ſide of the beam abaft the main hatchway, and to paſs down to the lower deck, and there ſtep in the beams: admitting it to be a ſtraight piece, it would come at the aft ſide of the lower deck beam the ſame as it does at the upper deck beam, in conſequence of thoſe two beams ranging well up and down with each other: it muſt therefore have a caſt under the upper deck beam, by which the lower part may be brought forward ſufficient to ſtop in the lower deck beam. The aftermoſt muſt be placed againſt the foreſide of the beam abaft the maſt, and ſtep on the beam below; but there is no neceſſity to provide a crooked piece as before, for the beam of the upper deck may be moved a little farther aft, till it admit of the bit ſtopping on the lower deck beam, unleſs the beam comes under a port, as in that caſe it muſt not by any means be moved. The croſs pieces to the bits ſhould be on the foreſide, and in height from the upper deck about one-third of the height between it and the quarter deck. With regard to the heads of the bits, the length of the ſhip's waiſt ſhould be conſidered; and if there is length enough from the forecaſtle to the foremoſt bits to admit of the ſpare geer being ſtowed thereon without reaching farther aft, the quarter deck may then run ſo far forward that the head of the foremoſt bits ſhall tenon in the foremoſt beam; this gives the mainmaſt another deck, and admits of the quarter deck being all that the longer: but if there is not the room before mentioned, then the quarter deck muſt run no further forward than the after bits, which will then tenon in the foremoſt beam; and the foremoſt bits muſt have a croſs piece let on their heads, which is termed a *horſe*, and will be for the purpoſe of receiving the ends of the ſpare geer.

The length of the quarter deck being now determined, the beams are then to be placed. For this purpoſe the ſeveral contrivances in the quarter deck muſt be previouſly conſulted. It is neceſſary to obſerve, that there are neither carlings nor lodges, the carlings of the hatches excepted, in the quarter deck, round-houſe, and forecaſtle; as they would weaken inſtead of ſtrengthening the beams, which ſhould be as ſmall as the ſize of the ſhip will permit, in order that the upper works may be as light as poſſible. Hence, as there are to be neither carlings nor lodges, the deck will require a greater number of beams, and a good round up, as on the contrary the deck will be apt to bend with its own weight. The moſt approved rule is therefore to have double the number of beams in the quarter deck as there are in a ſpace of the ſame length in the upper deck.

Then proceed to ſhift the beams to the beſt advantage,

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tage, conſulting the hatchways, ladder-ways, maſts, bits, wheel, &c. With reſpect to the ladder-ways on the quarter decks of all ſhips, there ſhould be one near the fore part of the great cabin for the officers, and another near the foremoſt end of the quarter deck, conſiſting of double ladders for the conveyance of the men up from the other decks in caſes of emergency; and likewiſe one on each ſide of the fore part of the quarter deck from the gangway: and in every ſhip of the line all the beams from the foremoſt ladder-way to the after one ſhould be open with gratings, both for the admiſſion of air, and for the greater expedition of conveying different articles in the time of action.

Two ſcuttles are to be diſpoſed one on each ſide of the mainmaſt, if it happens to come through the quarter deck, for the top tackles to paſs through, to hook to the eye bolts drove in the upper deck for that purpoſe.

The ſteering wheel ſhould be placed under the fore-part of the roundhouſe, and the two beams of the quarter deck, which come under it, ſhould be placed conformable to the two uprights, ſo that they may tenon in them. The quarter deck beams ſhould be kneed at each end with one hanging and one lodging knee; which adds greatly to the ſtrength of the ſide. The hanging knees which come in the great cabin may be of iron; their vertical arms to be two-thirds of the length of that of wood, and to reach the ſpirketing. It ſhould be obſerved, that the beam abaft, which comes under the ſcreen bulkhead, ſhould round aft agreeable to the round of the bulkhead, for the ſupport of the ſame.

The forecaſtle beams ſhould be placed according as the works of the deck will admit. The hatchways are therefore to be conſidered firſt. There ſhould be one for the funnel of the fire hearth to paſs through, and one for the copper to admit of vent for the ſteam; and alſo one or two over the galley as the forecaſtle will admit of. The fore-topſail-ſheet bits ſhould be ſo diſpoſed as to come one pair on the fore and one on the aft ſide of the maſt, to let into the ſide of the forecaſtle beams, and ſtep on the upper deck beams below: there ſhould alſo be a ladder-way at the fore part of the forecaſtle for the conveniency of the fore part of the ſhip.

The beams may now be placed agreeable thereto, their number being four more than there are in a ſpace in the upper deck equal in length to the forecaſtle; and where there happens to be a wide opening between the beams, as in the caſe of a hatchway, maſt room, &c. then half a beam of fir may be introduced to make good the deficiency. The foremoſt beam ſhould be of a breadth ſufficient to take the aft ſide of the inboard arms of the catheads, as they are ſecured upon this beam by being bolted thereto. Every beam of the forecaſtle ſhould be kneed at each end with one hanging and one lodging knee: the vertical arms of the hanging knees ſhould reach the ſpirketing, and the knees well bolted and carefully clenched.

Proceed to the roundhouſe; the ſame things being obſerved with reſpect to the beams as in the quarter deck: for as the roundhouſe beams are ſided very ſmall, it hence follows that they muſt be near to each other. Let therefore the number of beams on the roundhouſe be four more than in the ſame length of the quarter deck; every other beam being of fir for lightneſs, and every oak beam may be kneed at each end with one hanging and one lodging knee; the hanging knees abaft may be of iron, their vertical arms to be in length two thirds of thoſe of wood. The roundhouſe ſhould always have a great round up, both for ſtrength and conveniency. There muſt be on the roundhouſe a ſmall pair of knee-bits on each ſide of the mizenmaſt, turned round and ſcarfed over each other, and bolted through the maſt carlings. There muſt alſo be a companion on the roundhouſe placed over the middle of the coach, in order to give light thereto.

Application of the foregoing Rules to the Conſtruction of Ships.

With regard to placing the roundhouſe beams, the uprights of the ſteering wheel and the mizenmaſt are to be obſerved; as when the beams which interfere with thoſe parts are properly ſpaced, the reſt may be diſpoſed of at diſcretion, or at an equal diſtance from each other, and letting the beam over the ſcreen bulkhead have a proper round aft, agreeable to the quarter deck beam underneath.

The upper parts of the inboard works being now deſcribed, proceed next to the lower parts, or to thoſe which come below the lower deck. Draw in the orlop, by taking the heights afore, at midſhips, and abaft, between that and the gun-deck, from the dimenſions, and a curve deſcribed through theſe points will repreſent the upper part of the deck. Set off the thickneſs of the plank below, and the under ſide of the plank will be repreſented. As this deck does not run quite forward and aft as the other decks, the length of it muſt be therefore determined; for this purpoſe let the after beam be placed at a ſufficient diſtance from aft to admit of the bread rooms being of a proper ſize for the ſhip, which will be under that beam of the gun-deck that comes at the ſecond part from aft. The after beam being drawn in, proceed to ſpace the other beams, placing them exactly under thoſe of the gun-deck; and that which comes under the foremoſt beam of the gun-deck may terminate the fore part of the orlop. Draw the limber ſtrake, by ſetting off its thickneſs above the cutting down line, and a line drawn parallel thereto will repreſent the limber ſtrake. That part of the orlop which is over the after magazine, ſpirit room, and fiſh room, and alſo that which is over the fore magazine, is laid with thicker planks than the reſt of the deck; which is for the better ſecurity of thoſe places, the planks being laid over the beams; but in the midſhips, from the fore part of the ſpirit room to the aft part of the fore magazine, the beams are laid level with the ſurface of the deck, and the planks are rabbeted in from one beam to the other.

In order to repreſent the orlop as juſt deſcribed, the dimenſions of the different apartments above mentioned muſt be determined: Let the aft ſide of the after beam be the aft ſide of the after magazine, and from thence draw the bulkhead down to the limber ſtrake; and the foreſide of the third beam may be the foreſide of the after magazine, drawing that bulkhead likewiſe, which will alſo form the aft ſide of the fiſh room; the foreſide of the fiſh room may be drawn from the aft ſide of the fifth beam, which will alſo repreſent the aft ſide of the ſpirit room; then the foreſide of the ſpirit room may be drawn from the foreſide of the ſixth beam. Hence from the foreſide of the ſixth beam quite aft the deck will

Application of the foregoing Rules to the Conſtruction of Ships.

will be repreſented by the two lines already drawn, and the upper ſide of the beams will be repreſented by the lower line.

Proceed next to the fore part of the orlop, letting the foreſide of the after bits be the aft part of the foremoſt magazine, drawing the bulkhead thereof, which will come to the aft ſide of the ſixth beam; therefore, from the ſixth beam to the foremoſt end of the orlop, the plank and beams will be repreſented juſt in the ſame manner as before mentioned for the after part of the orlop: then the midſhip part of the deck will be repreſented by letting the upper line be the upper ſide of the plank, and likewiſe the upper ſide of the beams; and the lower line will repreſent the lower edge of the plank, only drawing it from beam to beam, and obſerving not to let it paſs through them.

The hatchways, &c. may now be repreſented on the orlop, letting the main, fore, and after hatchway, be exactly under thoſe of the gun-deck: there muſt be one over the fiſh room, and one over the ſpirit room. There muſt be two ſcuttles over the after magazine for the paſſage to the magazine and light room. There ſhould alſo be one afore the fourth beam from forward for the paſſage to the fore magazine, and one abaft the ſecond beam for the paſſage to the light room.

The bulkheads for the fore and after parts of the well may be drawn from the lower deck beams to the orlop, and from thence to the limber ſtrake in the hold. The ſhot lockers may alſo be repreſented, having one afore and one abaft the well: there ſhould alſo be one abaft the foremoſt magazine, the ends of which may be formed by the after bits. The ſteps of the maſts may be drawn in by continuing their centres down to the limber ſtrake; and likewiſe two crutches abaft the mizen ſtep divided equally between that and the after part of the cutting down: the breaſt hooks may alſo be drawn letting them be five in number below the lower deck hook, and all equally divided between that and the fore ſtep. Hence every part of the inboard is deſcribed as far as neceſſary.

CHAP. V. *Of the Method of Whole-moulding.*

46 Method of whole-moulding. *Murray's Ship-Building.*

HAVING now finiſhed the methods of laying down the ſeveral plans of a ſhip, any farther addition on this ſubject might appear unneceſſary. We cannot, however, with propriety, omit to deſcribe the method called *whole-moulding*, uſed by the ancients, and which ſtill continues in uſe among thoſe unacquainted with the more proper methods already explained. This method will be illuſtrated by laying down the ſeveral plans of a long-boat; the length of the keel being 29 feet, and breadth moulded nine feet.

47 Applied to a long boat. Plate CCCCXCIII Fig. 37.

Draw the ſtraight line PO (fig. 37.) equal to 29 feet, the extreme length of the boat, and alſo to repreſent the upper edge of the keel. Let ⊕ be the ſtation of the midſhip frame. From the points, P, ⊕, and O, draw the lines PT, ⊕M, and OS, perpendicular to PO. Make ⊕M, ⊕N, equal to the upper and lower heights of breadth reſpectively at the main frame, PT the height of breadth at the tranſom, and OS the height at the ſtem. Deſcribe the curve TMS to repreſent the ſheer or extreme height of the ſide, which in a ſhip would be called the *upper height of breadth line*, or upper edge of the wale. Through the point N draw a curve parallel to TMS, to repreſent the breadth of the upper ſtrake of a boat, or lower edge of the wale if in a ſhip. The dotted line TNS may alſo be drawn to repreſent the lower height of breadth. Method of Whole-moulding.

Set off the rake of the port from P to *p*, and draw the line *p t* to repreſent the aft ſide of the port; then T *t* will repreſent the round-up of the tranſom. Set off the breadth of the port from *p* to *r*, and from T to s, and draw the line *r* s to repreſent the foreſide of the port, which may either be a curve or a ſtraight line at pleaſure. Set up the height of the tuck from *p* to *k*. Let *k* X be the thickneſs of the tranſom, and draw the line ZX to repreſent the foreſide of the tranſom.

There is given the point S, the height of the ſheer on the foreſide of the ſtem; now that ſide of the ſtem is to be formed either by ſweeps or ſome other contrivance. Set off the breadth of the ſtem, and form the aft ſide of it.

Set up the dead-riſing from ⊕ to *d*, and form the riſing line r i s. Draw the line KL parallel to PO to repreſent the lower edge of the keel, and another to repreſent the thickneſs of the plank or the rabbet. The rabbet on the poſt and ſtem may alſo be repreſented; and the ſtations of the timbers aſſigned, as ⊕, (1), 1, 2, 3, 4, 5, 6, 7, 8, 9; and ⊕, (A), A, B, C, D, E, F, G, H; and the ſheer plan will be completed.

The half-breadth plan is to be formed next; for this purpoſe the perpendiculars TP, 9, 8, &c. muſt be produced. Upon M⊕ produced ſet off the half breadth from the line KL to R (fig. 38.); ſet off alſo the half breadth at the tranſom from K to *b*, and deſcribe the extreme half-breadth line *b* RX, making the forepart of the curve agreeable to the propoſed round of the tranſom. Fig. 38.

We may next proceed to form the timbers in the body plan. Let AB (fig. 39.) be the breadth moulded at ⊕. Erect the perpendicular CD in the middle of the line AB; draw the line *m n* diſtant therefrom the half thickneſs of the poſt, and *x y* the half thickneſs of the ſtern. Then take off the ſeveral portions of the perpendiculars ⊕, 1, 2, &c. intercepted between the upper edge of the keel and the riſing line in the ſheer plan, and ſet them up from C upon the line CD; through theſe points draw lines parallel to AC; take off alſo the ſeveral lower heights of breadth at ⊕, 1, 2, &c. from the ſheer plan; and ſet them up from C upon the middle line in the body plan; and draw lines parallel to AC through theſe points: Then take off the ſeveral half breadths correſponding to each from the floor plan; and ſet them off on their proper half-breadth lines from the middle line in the body plan. Fig. 39.

Conſtruct the midſhip frame by Problem V. the form of which will in ſome meaſure determine the form of the reſt. For if a mould be made on any ſide of the middle line to fit the curve part of it, and the riſing line, or that marked *bend mould* (fig. 40.), and laid in ſuch a manner that the lower part of it, which is ſtraight, may be ſet upon the ſeveral riſing lines, and the upper part juſt touch the point of the half breadth in the breadth line correſponding to that riſing upon which the mould is placed, a curve may then be drawn by the mould to the riſing line. In this manner we may proceed ſo far as the riſing line is parallel to the lower height of the breadth line. Then a hollow mould muſt be made, the upper end of which is left ſtraight, as Fig. 40.

that

Method of Whole-moulding.

that marked *hollow mould* (fig. 40.). This is applied in ſuch a manner, that ſome part of the hollow may touch the ſide of the keel, and the ſtraight part touch the back of the curve before deſcribed by the bend mould; and, beginning abaft, the ſtraight part will always come lower on every timber, till we come to the midſhip timber, when it comes to the ſide of the keel. Having thus formed the timbers, ſo far as the whole mouldings will ſerve, the timbers abaft them are next formed. Their half breadths are determined by the ſheer and floor plans, which are the only fixed points through which the curves of theſe timbers muſt paſs. Some form theſe after timbers before the whole is moulded, and then make the hollow mould, which will be ſtraighter than the hollow of either of theſe timbers. It is indifferent which are firſt formed, or what methods are uſed; for after the timbers are all formed, though every timber may appear very fair when conſidered by itſelf, it is uncertain what the form of the ſide will be. In order to find which, we muſt form ſeveral ribband and water lines; and if theſe do not make fair curves, they muſt be rectified, and the timbers formed from theſe ribband and water lines. In uſing the hollow mould, when it is applied to the curve of each timber, if the ſtraight part is produced to the middle line, we ſhall have as many points of interſection as there are timbers; and if the heights above the baſe be transferred to the correſponding timbers in the ſheer plan, a curve paſſing through theſe points is what is called a *riſing ſtrait*. This may be formed by fixing a point for the aftermoſt timber that is whole moulded, and transferring that height to the ſheer plan. The curve muſt paſs through this point, and fall in with the riſing line ſomewhere abaft dead flat; and if the ſeveral heights of this line be transferred from the ſheer to the middle line in the body plan, theſe points will regulate what is called the *hauling down* of the hollow mould.

The timbers in the after body being all formed, thoſe in the fore body are formed in the ſame manner, by transferring the ſeveral heights of the riſing and breadth lines from the ſheer to the body plans; the half breadths correſponding to each height muſt alſo be transferred from the floor to the body plan. The ſame hollow mould will ſerve both for the fore and after body; and the level lines, by which the water lines to prove the after body were formed, may be produced into the fore body, and by them the water lines to prove the fore body may be deſcribed.

Another method of proving the body is by ribband lines, which are formed by ſections of planes inclined to the ſheer plan, and interſecting the body plan diagonally, as before obſerved, of which there may be as many as may be judged neceſſary. As this has been already explained, we ſhall therefore lay down only one, repreſented in the body plan by the lines marked d i a. Theſe are drawn in ſuch a manner as to be perpendicular to as many timbers as conveniently may be. After they are drawn in the body plan, the ſeveral portions of the diagonal intercepted between the middle line and each timber muſt be transferred to the floor plan. Thus, fix one foot of the compaſſes in the point where the diagonal interſects the middle line in the body plan; extend the other foot to the point where the diagonal interſects the timber; for example, timber 9: Set off the ſame extent upon the perpendicular repreſenting the plane of timber 9 from the point where it interſects the line KL on the floor plan: in like manner proceed with all the other timbers both in the fore and after body; and theſe ſhall have the points through which the curve muſt paſs. If this ſhould not prove a fair curve, it muſt be altered, obſerving to conform to the points as nearly as the nature of the curve will admit: ſo it may be carried within one point, and without another, according as we find the timbers will allow. For after all the ribband lines are formed, the timbers muſt, if needful, be altered by the ribband lines: this is only the reverſe of forming the ribband lines; for taking the portions of the ſeveral perpendiculars intercepted between the line KL and the curve of the ribband line in the floor plan, and ſetting them off upon the diagonal from the point where it interſects the middle line, we ſhall have the points in the diagonal through which the curves of the timbers muſt paſs. Thus the diſtance between the line KL and the ribband at timber 3 on the floor plan, when transferred to the body plan, will extend on the diagonal from the middle line to the point where the curve of timber 3 interſects that diagonal. The like may be ſaid of all the other timbers; and if ſeveral ribband lines be formed, they may be ſo contrived that their diagonals in the body plan ſhall be at ſuch diſtances, that a point for every timber being given in each diagonal, will be ſufficient to determine the form of all the timbers.

Method of Whole-moulding.

In ſtationing the timbers upon the keel for a boat, there muſt be room for two futtocks in the ſpace before or abaft ⊕; for which reaſon, the diſtance between theſe two timbers will be as much more than that between the other as the timber is broad. Here it is between ⊕ and (A); which contains the diſtances between ⊕ and (1), and the breadth of the timber beſides.

The timbers being now formed, and proved by ribband and water lines, proceed then to form the tranſom, faſhion-pieces, &c. by Problem VI.

This method of whole-moulding will not anſwer for the long timbers afore and abaft. They are generally canted in the ſame manner as thoſe for a ſhip. In order to render this method more complete, we ſhall here deſcribe the manner of moulding the timbers after they are laid down in the mould loft, by a riſing ſquare, bend, and hollow mould.

It was ſhown before how to form the timbers by the bend and hollow moulds on the draught. The ſame method muſt be uſed in the loft; but the moulds muſt be made to their proper ſcantlings in real feet and inches. Now when they are ſet, as before directed, for moulding each timber, let the middle line in the body plan be drawn acroſs the bend mould, and draw a line acroſs the hollow mould at the point where it touches the upper edge of the keel; and let them be marked with the proper name of the timber, as in fig. 40. The graduations of the bend mould will therefore be exactly the ſame as the narrowing of the breadth. Thus, the diſtance between ⊕ and 7 on the bend mould is equal to the difference between the half breadth of timber 7 and that of ⊕. The height of the head of each timber is likewiſe marked on the bend mould, and alſo the floor and breadth firmarks. The floor firmark is in that point where a ſtraight edged batten touches the back

Method of Whole-moulding.

back of the bend mould, the batten being ſo placed as to touch the lower edge of the keel at the ſame time. The ſeveral riſings of the floor and heights of the cutting down line are marked on the riſing ſquare, and the half breadth of the keel is ſet off from the ſide of it.

The moulds being thus prepared, we ſhall apply them to mould timber 7. The timber being firſt properly ſided to its breadth, lay the bend mould upon it, ſo as may beſt anſwer the round according to the grain of the wood; then lay the riſing ſquare to the bottom of the bend mould, ſo that the line drawn acroſs the bend mould at timber 7 may coincide with the line repreſenting the middle of the keel upon the riſing ſquare; and draw a line upon the timber by the ſide of the ſquare, or let the line be ſcored or cut by a tool made for that purpoſe, called a *raſeing knife* (E); this line ſo raſed will be the ſide of the keel. Then the ſquare muſt be moved till the ſide of it comes to 7 on the bend mould, and another line muſt be raiſed in by the ſide of it to repreſent the middle of the keel. The other ſide of the keel muſt likewiſe be raſed after the ſame manner, and the point 7 on the riſing ſquare be marked on each ſide of the keel, and a line raſed acroſs at theſe points to repreſent the upper edge of the keel. From this line the height of the cutting-down line at 7 muſt be ſet up, and then the riſing ſquare may be taken away, and the timber may be raiſed by the bend mould, both inſide and outſide, from the head to the floor firmark, or it may be carried lower if neceſſary. After the firmarks and head of the timbers are marked, the bend mould may likewiſe be taken away, and then the hollow mould applied to the back of the ſweep in ſuch a manner that the point 7 upon it may interſect the upper ſide of the keel, before ſet off by the riſing ſquare; and when in this poſition the timber may be raſed by it, which will complete the outſide of the timbers. The inſide of the timbers may likewiſe be formed by the hollow mould. The ſcantling at the keel is given by the cutting down before ſet off. The mould muſt be ſo placed as to touch the ſweep of the inſide of the timber formed before by the bend mould, and paſs through the cutting down point.

The uſe of the firmarks is to find the true places of the futtocks; for as they are cut off three or four inches ſhort of the keel, they muſt be ſo placed that the futtock and floor firmarks may be compared and coincide. Notwithſtanding which, if the timbers are not very carefully trimmed, the head of the futtock may be either within or without its proper half breadth; to prevent which a half breadth ſtaff is made uſe of.

The half breadth ſtaff may be one inch ſquare, and of any convenient length. Upon one ſide of it are ſet off from one end the ſeveral half-breadths of all the timbers in the after body, and thoſe of the fore body upon the oppoſite ſide. On the other two ſides are ſet off the ſeveral heights of the ſheer, the after body on one ſide, and the fore body on its oppoſite. Two ſides of the ſtaff are marked *half breadths*, and the other two ſides *heights of the ſheer*.

The ſtaff being thus prepared, and the floor timbers faſtened on the keel, and levelled acroſs, the futtocks muſt next be faſtened to the floor timbers; but they muſt be ſet firſt to their proper half breadth and height. The half breadth ſtaff, with the aſſiſtance of the ram-line *, ſerves to ſet them to the half breadth; for as the keel of a boat is generally perpendicular to the horizon, therefore the line at which the plummet is ſuſpended, and which is moveable on the ram line, will be perpendicular to the keel. Whence we may by it ſet the timbers perpendicular to the keel, and then ſet them to their proper half breadths by the ſtaff: and when the two firmarks coincide, the futtock will be at its proper height, and may be nailed to the floor timbers, and alſo to the breadth ribband, which may be ſet to the height of the ſheer by a level laid acroſs, taking the height of the ſheer by the ſtaff from the upper ſide of the keel; by which means we ſhall diſcover if the ribband is exactly the height of the ſheer; and if not, the true height may be ſet off by a pair of compaſſes from the level, and marked on the timbers.

Practice of Ship-building.

* See next chapter.

CHAP. VI. *Of the Practice of Ship-building.*

THE elevation, projection, and half breadth plans, of a propoſed ſhip being laid down on paper, we muſt next proceed to lay down theſe ſeveral plans on the mould loft of the real dimenſions of the ſhip propoſed to be built, and from which moulds for each ſeparate part are to be made. The method of laying down theſe plans, from what has been already ſaid, will, it is preſumed, be no very difficult taſk to accompliſh, as it is no more than enlarging the dimenſions of the original draughts; and with reſpect to the moulds, they are very eaſily formed agreeable to the figure of the ſeveral parts of the ſhip laid down in the mould loft.

Blocks of wood are now to be prepared upon which the keel is to be laid. Theſe blocks are to be placed at nearly equal diſtances, as of five or ſix feet, and in ſuch a manner that their upper ſurfaces may be exactly in the ſame plane, and their middle in the ſame ſtraight line. This laſt is eaſily done by means of a line ſtretched a little more than the propoſed length of the keel; and the upper planes of theſe blocks may be verified by a long and ſtraight rule; and the utmoſt care and precaution muſt be taken to have theſe blocks properly bedded. Each block may be about ſix or eight inches longer than the keel is in thickneſs; their breadth from 12 to 14 inches, and their depth from a foot to a foot and half.

The dimenſions of the keel are to be taken from the mould loft, and the keel is to be prepared accordingly. As, however, it is ſeldom poſſible to procure a piece of wood of ſufficient length for a keel, eſpecially if for a large ſhip, it is, therefore, for the moſt part neceſſary to compoſe it of ſeveral pieces, and theſe pieces are to be ſcarfed together, and ſecurely bolted, ſo as to make one entire piece. It muſt, however, be obſerved, that the pieces which compoſe the keel ought to be of ſuch lengths, that a ſcarf may not be oppoſite to the ſtep of any of the maſts. Rabbets are to be formed on each ſide of the keel to receive the edge of the planks next to

(E) The term *raſeing* is uſed when any line is drawn by ſuch an inſtrument inſtead of a pencil.

Practice of Ship-building.

to it, or garboard ſtrake, and the keel is to be laid on the blocks (F).

The ſtem, and the poſt, and the ſeveral tranſoms belonging to it, are to be prepared from the moulds, and rabbeted in like manner as the keel, to receive the ends of the plank. The tranſoms are to be bolted to the poſt at their middle, each at its reſpective height, taken from the elevation in the mould loft, and the extremities of the tranſoms are to be firmly connected with the faſhion-pieces. Both ſtem and poſt are then to be erected, each at its reſpective extremity of the keel. The tenons at the heel of each being let into mortiſes prepared to receive them, and being ſet to their proper rakes or angles with the keel, are to be ſupported by props or ſhores. Pieces of wood called *dead wood* are to be laid upon and fixed to the upper ſide of the keel towards the fore and aft parts of it; the decpneſs of the dead wood increaſing with its diſtance from the middle, agreeable to the propoſed form of the cutting-down line.

A line is to be ſtretched from the middle of the head of the ſtem to that of the poſt, called the *ram line*, upon which is a moveable line with a plummet affixed to it. The midſhip and other frames are to be erected upon the keel at their proper ſtations. The extremities of each frame are ſet at equal diſtances from the vertical longitudinal ſection of the ſhip, by moving the frame in its own plane until the plumb-line coincides with a mark at the middle between the arms of each frame; and although the keel is inclined to the horizon, yet the frames may alſo be ſet perpendicular to the keel by means of the plumb-line. The ſhores which are ſupporting the frames are now to be ſecurely fixed, that the poſition of the frames may not be altered. The rib-bands are now to be nailed to the frames at their proper places, the more effectually to ſecure them; and the intermediate vacancies between the frames filled up with filling timbers. For a perſpective view of a ſhip framed, ſee fig. 2.

Plate ccccixxxiv. Fig. 2.

The frames being now ſtationed, proceed next to fix on the planks, of which the wales are the principal, being much thicker and ſtronger than the reſt. The harpins, which may be conſidered as a continuation of the wales at their fore ends, are fixed acroſs the hawſe pieces, and ſurround the fore part of the ſhip. The planks that incloſe the ſhip's ſides are then brought about the timbers; and the clamps, which are of equal thickneſs with the wales, fixed oppoſite to the wales within the ſhip. Theſe are uſed to ſupport the ends of the beams, and accordingly ſtretch from one end of the ſhip to the other. The thick ſtuff or ſtrong planks of the bottom within board are then placed oppoſite to the ſeveral ſcarfs of the timbers, to reinforce them throughout the ſhip's length. The planks employed to line the ſhip, called the *ceiling* or *foot-waling*, is next fixed in the intervals between the thick ſtuff of the hold. The beams are afterwards laid acroſs the ſhip to ſupport the decks, and are connected to the ſide by lodging and hanging knees: the former of which are exhibited at F, Plate CLXIX. See alſo the article DECK; and the hanging-knees, together with the breadth, thickneſs, and poſition of the keel, floor timbers, futtocks, top-timbers, wales, clamps, thick ſtuff, planks within and without, beams, decks, &c.

Practice of Ship-building.

The cable-bits being next erected, the *carlings* and *ledges*, repreſented in Plate CLXIX. are diſpoſed between the beams to ſtrengthen the deck. The *water-ways* are then laid on the ends of the beams throughout the ſhip's length, and the ſpirketing fixed cloſe above them.—The upper deck is then planked, and the *ſtring* placed under the *gunnel*, or *planſheer*, in the waiſt.

Then proceed next to plank the quarter-deck and forecaſtle, and to fix the *partners* of the maſts and capſterns with the *coamings* of the hatches. The *breaſt-hooks* are then bolted acroſs the ſtem and bow within-board, the ſtep of the foremaſt placed on the kelſon, and the *riders* fayed to the inſide of the timbers, to reinforce the ſides in different parts of the ſhip's length. The *pointers*, if any, are afterwards fixed acroſs the hold diagonally to ſupport the beams; and the crotches ſtationed in the after hold to unite the half timbers. The *ſteps* of the mainmaſt and capſterns are next placed; the planks of the lower decks and orlop laid; the *navel-hoods* fayed to the hawſe holes; and the *knees of the head*, or cut-water, connected to the ſtern. The figure of the head is then erected, and the *trail-board* and cheeks fixed on the ſide of the knee.

The *taffarel* and *quarter-pieces*, which terminate the ſhip abaft, the former above and the latter on each ſide, are then diſpoſed, and the ſtern and quarter galleries framed and ſupported by their brackets. The *pumps*, with their well, are next fixed in the hold; the *limber boards* laid on each ſide of the kelſon, and the *garboard ſtrake* fixed on the ſhip's bottom next to the heel without.

The hull being thus fabricated, proceed to ſeparate the apartments by bulkheads or partitions, to frame the port-lids, to fix the catheads and cheſs-trees; to form the hatchways and ſcuttles, and fit them with proper covers or gratings. Next fix the ladders at the different hatchways, and build the manger on the lower deck, to carry off the water that runs in at the hawſe-holes when the ſhip rides at anchor in a ſea. The bread-room and magazines are then lined; and the gunnel, rails, and gangways fixed on the upper part of the ſhip. The cleats, kevels, and ranges, by which the ropes are faſtened, are afterwards bolted or nailed to the ſides in different places.

The rudder, being fitted with its irons, is next hung to the ſtern-poſt, and the tiller or bar, by which it is managed, let into a mortiſe at its upper end. The *ſcuppers*, or leaden tubes, that carry the water off from the decks, are then placed in holes cut through the ſhip's ſides; and the *ſtandards* bolted to the beams and ſides above the decks to which they belong. The poop lanthorns are laſt fixed upon their cranes over the ſtern, and the *bilge-ways* or *cradles* placed under the bottom to conduct the ſhip ſteadily into the water whilſt launching.

(F) In ſhips of war, which are a long while in building, it has been found that the keel is often apt to rot before they are finiſhed. Upon this account, therefore, ſome builders have begun with the floor timbers, and added the keel afterwards.

Improvements in the Masts and Rudder.

As the various pieces which have been mentioned above are explained at large in their proper places, it is therefore superfluous to enter into a more particular description of them here.

Chap. VII. *Of Improvements in the Masts and Rudder.*

48 Improvements in masts.

An account of a method for restoring masts of ships when wounded, or otherwise injured, in an easy, cheap, and expeditious manner, by Captain Edward Pakenham of the royal navy, has been published in the tenth volume of the Transactions of the Society for the Encouragement of Arts, &c. Captain Pakenham introduces his invention with the following observations:

49 Of wounded masts, by Captain Pakenham. Page 209.

"Among the various accidents which ships are liable to at sea, none call more for the attention and exertion of the officer than the speedy refitting of the masts; and having observed, in the course of last war, the very great destruction made among the lower masts of our ship's from the enemy's mode of fighting, as well as the very great expence and delay in refitting a fleet after an action, particularly across the Atlantic—a very simple expedient has suggested itself to me as a resource in part; which appears so very speedy and secure, that the capacity of the meanest sailor will at once conceive it. I therefore think it my duty to state my ideas of the advantages likely to result from it; and I shall feel myself exceedingly happy should they in anywise contribute to remedy the evil.

"My plan, therefore, is, to have the heels of all lower masts so formed as to become the heads: but it is not the intention of the above plan to have the smallest alteration made in the heels of the present lower masts; for as all line-of-battle ships masts are nine inches in diameter larger at the heel than at the head, it will follow, that by letting in the treffel-trees to their proper depth, the mast will form its own cheeks or hounds; and I flatter myself the following advantages will result from the above alteration.

First, I must beg to observe, that all line-of-battle ships bury one third of their lower masts, particularly three-deckers; it therefore follows, that if the wounds are in the upper third, by turning the mast so as to make the heel the head, it will be as good as new; for, in eight actions I was present in last war, I made the following observations:

"That in the said actions fifty-eight lower masts were wounded, and obliged to be shifted, thirty-two of which had their wounds in the upper third, and of course the ships detained until new masts were made. And when it is considered that a lower mast for a 90 or 74 stands government in a sum not less, I am informed, than 2000l. or 2300l. the advantages across the Atlantic resulting from the aforesaid plan will be particularly obvious; not to mention the probability of there being no fit spars in the country, which was the case in the instances of the Isis and Princess Royal; and as I was one of the lieutenants of the Isis at that time, I am more particular in the circumstance of that ship. The Isis had both her lower masts wounded above the cathar pins in her action with the Cæsar, a French 74; and as there were no spars at New York, the Isis was detained five weeks at that place.—Now, if her masts had been fitted on the plan I have proposed, I am confident she would have been ready for sea in 48 hours; and as a further proof, I beg leave to add, that the whole fleet, on the glorious 12th of April, had not the least accident of any consequence except what befel their lower masts, which detained them between eight and ten weeks at Jamaica.

Improvements in the Masts and Rudder.

"The delay of a ship while a new mast is making, and probably the fleet being detained for want of that ship, which frequently occurred in the course of last war, the taking of shipwrights from other work, with a variety of inconveniences not necessary to mention here, must be obvious to every officer that has made the smallest observations on sea-actions.

"You will further observe, that this substitute is formed on the most simple principle, fitted to the meanest capacity, and calculated to benefit all ships, from a first-rate down to the smallest merchantman, in cases of an accident by shot, a spring, a rottenness, particularly as these accidents generally happen in the upper third of the mast and above the cheeks.

"It might probably be objected, that a difficulty and some danger might arise from the wounded part of the mast being below; but this will at once be obviated, when it is remembered, that as the wounded part is below the wedges, it may with ease be both fished, cased, and secured, to any size or degree you please, with the addition of its being wedged on each deck."

Fig. 41. represents a mast of a first-rate in its proper state, the figures representing its thickness at the different divisions. Plate cccxciii, Fig. 41.

Fig. 42. the same mast inverted, the heel forming the head, and the treffel-trees let into their proper depth, the additional thickness of the mast forming its own cheeks. Fig. 42.

Fig. 43. the proposed mast, the figures representing the thickness of the mast in the proposed alterations; *a*, the heel made square; *b*, the letting in of the treffel-trees; *c*, the third proportion of thickness continued up to where the fourth is in the present mast, or at least some little distance above the lower part of the cheeks, which is always looked upon as the weakest part of the mast; and by its being so proportioned, the mast, when turned, will be nearly as strong in the partners as before. Fig. 43.

As the expence of a mast is much greater than is generally imagined, it is therefore thought proper to subjoin the following statement of the several articles used in making a 74 gun ship's mainmast.

	Value.		
Fishes for a spindle, 21 inches, 2 nails of two masts, - -	L. 101	3	11
Two side fishes, 22 inches, 2 ditto, -	133	10	9
Fore and aft fishes, 22 inches, 2 nails of one mast, - - -	66	13	10
Fish, 21½ inches, 1 nail of half a mast, On the fore part	29	8	5
Iron, 3 qrs. 19 lbs. - -	1	5	9
Aries load baulk, 2 loads 22 feet, -	12	2	5
Breadthning, 2 loads 7 feet, - Dantzic fir timber.	11	1	7
Cheeks, 4 loads 2 feet, -	20	18	4
Iron, 5 cwt. 2 qrs. 24 lb. - -	8	0	0
Knees, elm timber, 13 feet, -	0	15	2
Iron, 2 qrs. 14 lb. - - -	0	17	6
Carried over L.	385	17	8

Papers on Naval Architecture. part 2.

Improvements in the Masts and Rudder.

	Value.		
Brought over	L. 385	17	8
Hoops and bolts on the body, 13 cwt. 1 qr. 16 lb.	18	15	0
Treffel-trees, ſtraight oak timber, ſecond ſort, 2 loads 10 feet,	10	2	4
Iron, 3 qrs. 10 lb.	1	3	6
Croſs trees, ſtraight oak timber, ſecond ſort, 1 load 12 feet,	5	14	0
Iron, 2 qrs. 2 lb.	0	14	6
Cap, elm timber, 1 load 24 feet,	4	6	0
Iron, 2 cwt. 14 lb.	2	19	6
Fullings, bolſters, bollins, and Dantzic fir, 1 load 2 feet,	5	7	8
Workmanſhip,	78	6	0
	L. 513	6	2
Main-topmaſt of a 74 gun ſhip,	50	16	3
Main-top-gallant-maſt,	8	11	0

Principles of Naval Architecture, p. 50.

Mr Gordon's plan of building maſts.

In order to leſſen the enormous expence of maſts, a propoſal was made ſome years ago to conſtruct them hollow; and the author having premiſed ſeveral experiments which he had made, proceeds as follows:

"Galileo taught us, that the reſiſtance or ſtrength of a hollow cylinder is to that of a full cylinder, containing the ſame quantity of matter, as the total diameter of the hollow one is to the diameter of the full one; and theſe experiments ſhow us, that the ſtrength or reſiſtance of two or more pieces of wood, faſtened together at each end, and connected by a pillar, pillars, or framing, increaſes, at leaſt to a certain degree, *cæteris paribus*, as the diſtance between them and number of pillars, provided the force is applied in the line or direction of the pillars.

"It is ſurpriſing that this diſcovery of Galileo has not been made ſubſervient to more uſeful purpoſes. It is particularly applicable to the conſtruction of maſts, as not requiring that the hollow cylinder ſhould be made of one ſolid piece of wood (G).

"However, the foregoing experiments teach us, that the ſame advantages may be obtained by other forms beſides that of a cylinder; and that perhaps not only in a ſuperior degree, but likewiſe with greater facility of execution; as by adopting a ſquare figure, but more particularly by conſtructing them of ſeparate pieces of wood, placed at proper diſtances from each other, in the following or any other manner that may be found moſt convenient. Fig. 44, 45, and 46. exhibit each the tranſverſe ſection of a maſt, in which the ſmall circles repreſent the trees or upright pieces of wood, and the lines the beams or framing of wood, which are employed at proper places and at proper diſtances from each other, for connecting them together. Perhaps ſolid frames of wood, placed at proper diſtances from each other, and filling up the whole dotted ſpace, would anſwer better; in which event, the maſt could be ſtrongly hooped with iron at thoſe places, and the upright trees formed ſquare, or of any other convenient form.

Fig. 44. Fig. 45. Fig. 46.

"It will be evident to thoſe acquainted with this ſubject, that ſuch maſts would be greatly ſtronger than common ones containing the ſame quantity of materials. It is likewiſe evident that they would be leſs apt to ſpring, as being ſupported on a more extended baſe, and affording many conveniences for being better ſecured; and that they might be conſtructed of ſuch wood as at preſent would be deemed altogether improper for maſts: a circumſtance of importance to Britain at all times, but more particularly now, when there is ſuch difficulty in procuring wood proper for the kind of maſts in common uſe."

Improvements in the Masts and Rudder.

51 An improvement of the rudder.

An improvement in the rudder has lately taken place in ſeveral ſhips, particularly in ſome of thoſe in the ſervice of the Eaſt India Company. It will, however, be neceſſary previouſly to deſcribe the uſual form of the rudder, in order to ſhow the advantages it poſſeſſes when conſtructed agreeable to the improved method.

Papers on Naval Architecture, part 1. Fig. 47.

N° 1. (fig. 47.) repreſents the rudder according to the common method of conſtruction; in which AB is the axis of rotation. It is hence evident that a ſpace conſiderably greater than the tranſverſe ſection of the rudder at the counter muſt be left in the counter for the rudder to revolve in. Thus, let CAB (N° 2.) be the ſection of the rudder at the counter; then there muſt be a ſpace ſimilar to CDE in the counter, in order that the rudder may be moveable as required. Hence, to prevent the water from waſhing up the rudder caſe, a rudder coat, that is, a piece of tarred canvas, is nailed in ſuch a manner to the rudder and counter as to cover the intermediate ſpace: but the canvas being continually waſhed by the ſea, ſoon becomes brittle, and unable to yield to the various turns of the rudder without breaking; in which caſe the ſhip is of courſe left pervious to the waves, even of three or four feet high; in fact, there are few men bred to the ſea who have not been witneſſes to the bad effects of ſuch a ſpace being left ſo ill guarded againſt the ſtroke of the waves; and many ſhips have, with great probability, been ſuppoſed to founder at ſea from the quantity of water ſhipped between the rudder and counter.

Fig. 48.

It was to remedy this defect that the alteration above alluded to took place; which conſiſts in making the upper part AFG (fig. 48. N° 1.) of the rudder ABD cylindrical, and giving that part at the ſame time a caſt forward, ſo that the axis of rotation may by that means be the line AD, paſſing as uſual from E to D, through the centres of the braces which attach the rudder to the ſtern-poſt, and from E to A through the axis of the cylinder AFG, in order that the tranſverſe ſection KH (N° 2.) at the counter may be a circle revolving upon its centre; in which caſe the ſpace of half an inch is more than ſufficient between the rudder and the counter, and conſequently the neceſſity of a rudder coat entirely done away. But as it was foreſeen, that if the rudder

(G) The ſtrength of theſe cylinders would be ſtill further augmented by having ſolid pieces of wood placed within them at proper diſtances, and ſecurely faſtened to them, in the ſame manner, and on the ſame principles, that nature has furniſhed reeds with joints; and for anſwering, in ſome reſpects, the ſame purpoſe as the pillars in the experiments alluded to.

Load-water Line and Ship's Capacity.

rudder by an accident was unſhipped, this alteration might endanger the tearing away of the counter, the hole is made much larger than the tranſverſe ſection of the cylindric part of the rudder, and the ſpace between filled up with pieces of wood ſo fitted to the counter as to be capable of withſtanding the ſhock of the ſea, but to be eaſily carried away with the rudder, leaving the counter, under ſuch circumſtances, in as ſafe a ſtate as it would be agreeable in the preſent form of making rudders in the navy.

CHAP. VIII. *Upon the Poſition of the Load-water Line, and the Capacity of a Ship.*

See Hydrodynamics.

THE weight of the quantity of water diſplaced by the bottom of a ſhip is equal to the weight of the ſhip with its rigging, proviſions, and every thing on board. If, therefore, the exact weight of the ſhip when ready for ſea be calculated, and alſo the number of cubic feet in the ſhip's bottom below the load-water line, and hence the weight of the water ſhe diſplaces; it will be known if the load-water line is properly placed in the draught.

Ship-Builder's Repoſitory.

The poſition of the ſhip in the draught may be either on an even keel, or to draw moſt water abaft; but an even keel is judged to be the beſt poſition in point of velocity, when the ſhip is conſtructed ſuitable thereto, that is, when her natural poſition is ſuch. For when a ſhip is conſtructed to ſwim by the ſtern, and when brought down to her load-water made to ſwim on an even keel (as is the caſe with moſt ſhips that are thus built), her velocity is by that means greatly retarded, and alſo her ſtrength greatly diminiſhed: for the fore-part being brought down lower than it ſhould be, and the middle of the ſhip maintaining its proper depth in the water, the after part is by that means lifted, and the ſhip is then upon an even keel: but in conſequence of her being out of her natural poſition, the after part is always preſſing downwards with a conſiderable ſtrain, which will continue till the ſhip's ſheer is entirely broken, and in time would fall into its natural poſition again: for which reaſon we ſee ſo many ſhips with broken backs, that is, with their ſheers altered in ſuch a manner that the ſheer rounds up, and the higheſt part is in the midſhips.

Such are the diſadvantages ariſing from not paying a due attention to thoſe points in the conſtruction of a draught; therefore, when the load-water line is found to be ſo ſituated at a proper height on the draught, according to the weight given for ſuch a ſhip, and alſo drawn parallel to the keel, as ſuppoſing that to be the beſt ſailing trim, the next thing is to examine whether the body is conſtructed ſuitable thereto, in order to avoid the above-mentioned ill conſequences.

In the firſt place, therefore, we muſt divide the ſhip equally in two lengthwiſe between the fore and after perpendiculars; and the exact number of cubic feet in the whole bottom beneath the load-water line being known, we muſt find whether the number of cubic feet in each part ſo divided is the ſame; and if they are found to be equal, the body of the ſhip may then be ſaid to be conſtructed in all reſpects ſuitable to her ſwimming on an even keel, let the ſhape of the body be whatever it will; and which will be found to be her natural poſition at the load-water line. But if either of the parts ſhould contain a greater number of cubic feet than the other, that part which contains the greateſt will ſwim the moſt out of the water, and conſequently the other will ſwim deepeſt, ſuppoſing the ſhip in her natural poſition for that conſtruction. In order, therefore, to render the ſhip ſuitably conſtructed to the load-water line in the draught, which is parallel to the keel, the number of cubic feet in the leſs part muſt be ſubtracted from the number contained in the greater part, and that part of the body is to be filled out till it has increaſed half the difference of their quantities, and the other part is to be drawn in as much: hence the two parts will be equal, that is, each will contain the ſame number of cubic feet, and the ſhip's body will be conſtructed in a manner ſuitable to her ſwimming on an even keel.

Load-water Line and Ship's Capacity.

If it is propoſed that the ſhip laid down on the draught ſhall not ſwim on an even keel, but draw more water abaft than afore, then the fore and after parts of the ſhip's body below the load-water line are to be compared; and if theſe parts are unequal, that part which is leaſt is to be filled out by half the difference, and the other part drawn in as much as before.

It will be neceſſary, in the firſt place, to calculate the weight of a ſhip ready equipped for ſea, from the knowledge of the weight of every ſeparate thing in her and belonging to her, as the exact weight of all the timber, iron, lead, maſts, ſails, rigging, and in ſhort all the materials, men, proviſions, and every thing elſe on board of her, from which we ſhall be able afterwards to judge of the truth of the calculation, and whether the load-water line in the draught be placed agreeable thereto. This is indeed a very laborious taſk, upon account of the ſeveral pieces of timber, &c. being of ſo many different figures, and the ſpecific gravity of ſome of the timber entering the conſtruction not being preciſely determined.

In order to aſcertain the weight of the hull, the timber is the firſt thing which comes under conſideration: the number of cubic feet of timber contained in the whole fabric muſt be found; which we ſhall be able to do by help of the draught and the principal dimenſions and ſcantlings; obſerving to diſtinguiſh the different kinds of timber from each other, as they differ conſiderably in weight; then the number of cubic feet contained in the different ſorts of timber being reduced into pounds, and added, will be the weight of the timber. In like manner proceed to find the weight of the iron, lead, paint, &c. and the true weight of the whole will be found.

In reducing quantity to weight, it may be obſerved that a cubic foot of oak is equal to 66 pounds, and the ſpecific gravity of the other materials is as follows:

See Hydrodynamics.

Water being	1000	Oak is	891.89
Lead is	11345	Dry elm	702.70
Iron	7643	Dry fir	648.64

Load-water Line and Ship's Capacity.

Plates CCCCXC. CCCCXCI.

An Eſtimate of the Weight of the Eighty Gun Ship in Plates CCCCXC. and CCCCXCI. *as fitted for Sea, with Six Months Proviſions.*

52 Eſtimate of the weight of the eighty gun ſhip before laid down.

Weight of the Hull.

	N° of Ft.	N° of lbs.	Tons.	Lbs.
Oak timber at 66 lb. to the cubic foot	48497	3200802	1428	2082
Fir timber at 48 lb. to the cubic foot	4457	213936	95	1136
Elm timber at 52 lb. to the cubic foot	520	27040	12	160
Carve work and lead work		4651	2	171
Iron work, rudder irons, chain-plates, nails, &c.		88254	39	894
Pitch, tar, oakum, and paint - -		17920	8	
Cook-room fitted with fire hearth - -		16123	7	443
Sum - -		3568726	1593	406

Weight of the Furniture.

	N° of lbs.	Tons.	Lbs.
Complete ſet of maſts and yards, with the ſpare geer -	161000	71	1960
Anchors with their ſtocks, and maſter's ſtores -	39996	17	1916
Rigging - -	69128	30	1928
Sails, complete ſet, and ſpare	32008	14	648
Cables and hawſers -	73332	32	1652
Blocks, pumps, and boats	62056	27	1576
Sum - -	437520	195	720

Weight of the Guns and Ammunition.

Guns with their carriages -	377034	168	714
Powder and ſhot, powder barrels, &c. - - -	116320	51	2080
Implements for the powder	6500	2	2020
Ditto for guns, crows, handſpikes, &c. - - -	21573	9	1413
Sum - - -	521427	232	1747

Weight of the Officers Stores, &c.

Carpenter's ſtores - -	20187	9	27
Boatſwain's ſtores - -	21112	9	952
Gunner's ſtores - -	8964	4	4
Caulker's ſtores - -	5200	2	720
Surgeon and chaplain's effects	11096	4	2136
Sum - -	66559	29	1599

Weight of the Proviſions.

Proviſions for ſix months for 700 men, with all their equipage	858970	383	1050
Water, caſks, and captain's table	933900	416	2060
Sum - -	1792870	800	870

Weight of the Men, &c.

	N° of lbs.	Tons.	Lbs.
Seven hundred men with their effects, including the officers and their effects -	316961	141	1121
Ballaſt - -	1478400	660	
Sum - -	1795361	801	1121

RECAPITULATION.

The hull - -	3568726	1593	406
The furniture - -	437520	195	720
Guns and ammunition -	521427	232	1747
Officers ſtores - -	66559	29	1599
Proviſions - -	1792870	800	870
Weight of the men and ballaſt	1795361	801	1121
Sum - -	8182463	3652	1983

Agreeable to the above eſtimate, we find that the eighty gun ſhip, with every thing on board and fit for ſea, when brought down to the load-water line, weighs 8,182,463 pounds, or nearly 3653 tons. It may now be known if the load-water line in the draught be properly placed, by reducing the immerſed part of the body into cubic feet. For if the eighty gun ſhip, when brought down to the load-water line, weighs 3653 tons, the quantity of water diſplaced muſt alſo be 3653 tons: now a cubic foot of ſalt water being ſuppoſed to weigh 74 pounds, if therefore 8182463 be divided by 74, the quotient is 110573, the number of cubical feet which ſhe muſt diſplace agreeable to her weight.

It is now neceſſary to find the number of cubic feet contained in the ſhip's bottom below the load-water line by calculation. If the bottom was a regular ſolid, this might be very eaſily done; but as it is otherwiſe, we muſt be ſatisfied with the following method by approximation, firſt given by M. Bouguer.

53 Method of calculating the contents of the bottom of a ſhip.

Take the lengths of every other of the lines that repreſent the frames in the horizontal plane upon the upper water line; then find the ſum of theſe together, with half the foremoſt and aftermoſt frames. Now multiply that ſum by the diſtance between the frames, and the product is the area of the water line contained between the foremoſt and aftermoſt frames: then find the area of that part abaft the after frame, which forms a trapezium, and alſo the poſt and rudder; find alſo the area of that part afore the foremoſt frame, and alſo of the ſtem and gripe; then theſe areas being added to that firſt found, and the ſum doubled, will be the area of the ſurface of the whole water line. The reaſon of this rule will be obvious to thoſe aequainted with the firſt principles of mathematics.

The areas of the other water line may be found in the ſame manner: then the ſum of all theſe areas, except that of the uppermoſt and lowermoſt, of which only one half of each muſt be taken, being multiplied by the diſtance between the water lines (theſe lines in the plane of elevation being equidiſtant from each other), and the product will be the ſolid content of the ſpace contained between the lower and load-water lines.

Add

Load-water Line and Ship's Capacity.

Add the area of the lower water line to the area of the upper ſide of the keel; multiply half that ſum by the diſtance between them, the product will be the ſolid content of that part between the lower water line and upper edge of the keel, ſuppoſing them parallel to each other. But if the lower water line is not parallel to the keel, the above half ſum is to be multiplied by the diſtance between them at the middle of the ſhip.

The ſolid contents of the keel muſt be next found, by multiplying its length by its depth, and that product by the breadth. Then the ſum of theſe ſolid contents will be the number of cubic feet contained in the immerſed part of the ſhip's bottom, or that part below the load water line.

Determination of the number of Cubic Feet contained in the Bottom of the Eighty Gun Ship. See Plates CCCCXC. and CCCCXCI.

54 Applied to the eighty-gun ſhip.

The fore body is divided into five, and the after body into ten, equal parts in the horizontal plane; beſides the parts contained between the foremoſt timber and the ſtem, and the aftermoſt timber and the poſt. The plane of elevation is alſo divided into five equal parts by water lines drawn parallel to the keel. Theſe water lines are alſo deſcribed upon the horizontal plane.

It is to be obſerved that there muſt be five inches added to each line that repreſents a frame in the horizontal plane for the thickneſs of the plank, that being nearly a mean between the thickneſs of the plank next the water and that on the lower part of the bottom.

Upper Water Line abaft Dead Flat.

	Ft.	In.
The breadth at frame dead flat is 24 feet 10 inches, one-half of which is	12	5
frame (4)	24	10
frame 3	24	10
frame 7	24	10
frame 11	24	10
frame 15	24	9½
frame 19	24	5
frame 23	23	10
frame 27	22	9
frame 31	20	11
frame 35 is 16 feet 3 inches, the half of which is	8	1½
Sum	236	7
Diſtance between the frames	10	11
Product	2582	8½
Area of that part abaft frame 35	78	0
——— rudder and poſt	5	6
Sum	2666	2½
		2
Area of the load water line from dead flat aft	5332	5

Second Water Line abaft Dead Flat.

Load-water Line and Ship's Capacity.

	Ft.	In.
The breadth at frame dead flat is 23 feet 10½ inches, the half of which is	11	11¼
frame (4)	23	10½
frame 3	23	10½
frame 7	23	10½
frame 11	23	10½
frame 15	23	8½
frame 19	23	3½
frame 23	22	5
frame 27	20	10
frame 31	17	8
frame 35 is 8 feet 6 inches, the half of which is	4	3
Sum	219	7¼
Diſtance between the frames	10	11
Product	2397	4
Area of that part abaft frame 35 rudder and poſt	31	7
	5	5
Sum	2434	4
		2
Area of the 2d water line from dead flat aft	4868	8

Third Water Line abaft Dead Flat.

The breadth at frame dead flat is 22 feet 1½ inches—half	11	0¾
frame (4)	22	1½
frame 3	22	1½
frame 7	22	1½
frame 11	22	1
frame 15	21	5
frame 19	20	8½
frame 23	19	3½
frame 27	16	5
frame 31	11	2½
frame 35 is 4 feet 3 inches—half	2	1½
	190	8¼
	10	11
	2081	8
Area of that part abaft frame 35	14	5½
rudder and poſt	5	6
	2101	7½
		2
Area of the 3d water line from dead flat aft	4203	3

Fourth Water Line abaft Dead Flat.

The breadth at frame dead flat is 20 feet 1 inch—half	10	0½
frame (4)	20	1
frame 3	20	1
frame 7	19	11
frame 11	19	7½
frame 15	19	0
Carry over	108	9

Brought

Load-water Line and Ship's Capacity.

		Ft.	In.
	Brought over	1809	9
Breadth at	frame 19	17	7½
	frame 23	14	10
	frame 27	10	11
	frame 31	5	11
	frame 35 is 1 foot 11½ inches—half	0	11½
		159	0
		10	11
		1735	9
Area of that part abaft frame 35		9	9
rudder and poſt		5	0
		1750	6
			2
Area of the 4th water line from dead flat aft		3501	0

Fifth or Lower Water Line abaft Dead Flat.

The breadth at	frame dead flat is 17 feet 2 inches—half	8	7
	frame (4)	17	2
	frame 3	17	2
	frame 7	17	1
	frame 11	16	4
	frame 15	15	4
	frame 19	13	1
	frame 23	8	9
	frame 27	4	10
	frame 31	2	11
	frame 35 is 1 foot 2½ inches—half	0	7¼
		121	10¼
		10	11
		1330	2
Area of that part abaft frame 35		4	8½
rudder and poſt		4	6½
		1339	5
			2
Area of the 5th or lower water line from dead flat aft		2678	10
Half the area of the load water line		2666	2½
Area of the ſecond water line		4868	8
Area of the third water line		4203	3
Area of the fourth water line		3501	0
Half the area of the lower water line		1339	5
Sum		16578	6½
Diſtance between the water lines		4	1
Content in cubic feet between the lower and load water lines		67695	8½
Area of the lower water line	2678 10		
Area of the upper ſide of the keel	206 4		
Sum	2885 2		
Half	1442 7		
Diſtance between the lower water line and the keel	4 1		
Cub. feet contained between lower water line and the keel	5890 6½	5890	6½
Content of the keel, lower part of rudder, and falſe keel		464	3
Cubic feet abaft the midſhip frame under water when loaded		74050	6

Load-water Line and Ship's Capacity.

Upper or Load water Line afore Dead Flat.

		Ft.	In.
The breadth at	frame dead flat is 24 feet 10 inches—half	12	5
	frame E	24	10
	frame I	24	8½
	frame N	24	0
	frame Q	21	10½
	frame W is 15 feet 1 inch—half	7	6½
Sum		115	4½
Diſtance between the frames		10	11
Product		1259	6
Area of the part afore frame W		80	3
ſtem and knee		4	0
Sum		1343	9
Multiply by			2
Area of the load water line from dead flat forward		2687	6

Second Water Line afore Dead Flat.

The breadth at	frame dead flat is 23 feet 10½ inches—half	11	11¼
	frame E	23	10
	frame I	23	5
	frame N	22	5
	frame Q	19	11
	frame W is 11 feet 11 inches—half	5	11½
Sum		107	5¾
Diſtance between the frames		10	11
Product		1173	9
Area of the part afore frame W, with the ſtem and knee		43	9
Sum		1217	6
			2
Area of the ſecond water line from dead flat forward		2435	8

Third Water Line afore Dead Flat.

The breadth at	frame dead flat is 22 feet 1½ inch—half	11	0¼
	frame E	22	1
	frame I	21	8
	frame N	20	1
	frame Q	16	1½
	frame W is 7 feet—half	3	6
Sum		94	6¼
Diſtance between the frames		10	11
Product		1031	10
Area of the part afore W, with the ſtem and gripe		25	10
Sum		1057	8
			2
Area of the third water line from dead flat forward		2115	4

Load-water Line and Ship's Capacity.

Fourth Water Line afore Dead Flat.

		Ft.	In.
The breadth at	frame dead flat is 20 feet 1 inch—half	10	0½
	frame E	20	0½
	frame I	19	3
	frame N	16	5
	frame Q	11	2
	frame W is 2 feet nine inches—half	1	4½
Sum		78	3½
Diſtance between the frames		10	11
Product		854	8
Area of part before W, with the ſtem and gripe		8	10¾
Sum		863	6¾
			2
Area of fourth water line from dead flat forward		1727	1½

Fifth Water Line afore Dead Flat.

		Ft.	In.
Breadth at	frame dead flat is 17 feet 2 inches—half	8	7
	frame E	16	9
	frame I	14	10
	frame N	10	9½
	frame Q is 5 feet—half	2	6
Sum		53	5½
Diſtance between the frames		10	11
Product		583	7
Area of part afore Q		26	2½
ſtem and knee		5	11½
Sum		615	9
			2
Area of the fifth or lower water line from dead flat forward		1231	6
Area of the upper ſide of the keel		87	4
Sum		1318	10
Half		659	5
Diſtance between the lower water line and keel		4	1
Content of the part contained between the lower water line and the keel in cub. feet		2692	7¼
Half of the area of the load water line		1343	9
Area of the ſecond water line		2435	0
third water-line		2115	4
fourth water-line		1727	1½
Half the area of the fifth or lower water line		615	9
Sum		8236	11½
Diſtance between the water lines		4	1

	Ft.	In.
Cubic feet contained between the lower and load water lines	33634	2¾
Cubic feet contained between lower water line and keel	2692	7½
Content of the keel and falſe keel	196	6
Content afore midſhip frame under water when loaded	36523	4
Content abaft midſhip frame	74050	6
Content under water	110573	10
Weight of a cubic foot of ſalt water	74lbs.	
Weight of the whole ſhip with every thing on board	8182463.8lbs.	

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As the weight of the ſhip, with every thing on board, found by this calculation, is equal to that found by eſtimate; it hence appears that the water line is properly placed in the draught. It now only remains to find whether the body is conſtructed ſuitably thereto, that is, whether the ſhip will be in her natural poſition when brought down to that line. For this purpoſe a perpendicular muſt be erected 27 feet ¼ inch. abaft dead flat, which will be the middle between the two perpendiculars and the place where the centre of gravity ſhould fall, that the ſhip may ſwim on an even keel. The ſolidity of that part of the bottom contained between the ſaid perpendicular and dead flat is then to be calculated, which will be found to be 25846 feet 7 inches.

Solidity of the bottom afore dead flat	36523 f.	4 in.
——— between the middle and dead flat	25846	7
Solid content of the fore part of the bottom	62369	11
Solidity of the bottom abaft dead flat	74050	6
——— between the middle and dead flat	25846	7
Solid content of the aft. part of the bot.	48203	11
——— fore part of the bottom	62369	11
Difference	14166	
Half	7083	

Hence the after part of the ſhip's bottom is too lean by 7083 cubic feet, and the fore part as much too full. The after part muſt therefore be filled out until it has received an addition of 7083 feet, and the fore part muſt be drawn in till it has loſt the ſame quantity, and the bottom will then be conſtructed ſuitable to the ſhip's ſwimming on an even keel.

CHAP. IX. *Of the Tonnage of a Ship.*

55 Proper method of calculating the tonnage of a ſhip.

THIS is a queſtion of equal importance and difficulty. By the tonnage of a ſhip is meant the weight of every thing that can with ſafety and expediency be taken on board that ſhip for the purpoſe of conveyance; it is alſo called the *ſhip's burthen;* and it is totally different from the weight of the whole as ſhe floats in the water. It is perhaps beſt expreſſed by calling it the *weight of the cargo.* It is of importance, becauſe it is by this that the merchant or freighter judges of the fitneſs of

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of the ſhip for his purpoſe. By this government judge of the ſhips requiſite for tranſport ſervice, and by this are all revenue charges on the ſhip computed. It is no leſs difficult to anſwer this queſtion by any general rule which ſhall be very exact, becauſe it depends not only on the cubical dimenſions of the ſhip's bottom, but alſo on the ſcantling of her whole frame, and in ſhort on the weight of every thing which properly makes part of a ſhip ready to receive on board her cargo. The weight of timber is variable; the ſcantling of the frame is no leſs ſo. We muſt therefore be contented with an average value which is not very remote from the truth; and this average is to be obtained, not by any mathematical diſcuſſion, but by obſervation of the burthen or cargo actually received, in a great variety of caſes. But ſome ſort of rule of calculation muſt be made out. This is and muſt be done by perſons not mathematicians. We may therefore expect to find it incapable of being reduced to any principle, and that every builder will have a different rule. Accordingly the rules given for this purpoſe are in general very whimſical, meaſures being uſed and combined in a way that ſeems quite unconnected with ſtereometry or the meaſurement of ſolids. The rules for calculation are even affected by the intereſts of the two parties oppoſitely concerned in the reſult. The calculation for the tonnage by which the cuſtoms are to be exacted by government are quite different from the rule by which the tonnage of a tranſport hired by government is computed; and the ſame ſhip hired as a tranſport will be computed near one half bigger than when paying importation duties.

Yet the whole of this might be made a very ſimple buſineſs and very exact. When the ſhip is launched, let her light water line be marked, and this with the cubical contents of the immerſed part be noted down, and be ingroſſed in the deed by which the property of the ſhip is conveyed from hand to hand. The weight of her maſts, ſails, rigging, and ſea-ſtores, is moſt eaſily obtained; and every builder can compute the cubical contents of the body when immerſed to the load water line. The difference of theſe is unqueſtionably the burthen of the ſhip.

It is evident from what has been already ſaid in the laſt chapter, that if the number of cubic feet of water which the ſhip diſplaces when light, or, which is the ſame, the number of cubic feet below the light water line, found by the preceding method of calculation, be ſubtracted from the number of cubic feet contained in the bottom below the load water line, and the remainder reduced to tons by multiplying by 74, the number of pounds in a cubic foot of ſea water, and divided by 2240, the number of pounds in a ton, the quotient will be the tonnage.

But as this method is very troubleſome, the following rule for this purpoſe is that which is uſed in the king's and merchants ſervice.

56 Common rule.

Let fall a perpendicular from the foreſide of the ſtem at the height of the hawſe holes (H), and another perpendicular from the back of the main poſt at the height of the wing tranſom. From the length between theſe two perpendiculars deduct three-fifths of the extreme breadth (1), and alſo as many times 2½ inches as there are feet in the height of the wing tranſom above the upper edge of the keel; the remainder is the length of the keel for tonnage. Now multiply this length by the extreme breadth, and the product by half the extreme breadth, and this laſt product divided by 94 is the tonnage required.

Tonnage of a Ship.

Or, multiply the length of the keel for tonnage by the ſquare of the extreme breadth, and the product divided by 188 will give the tonnage.

Calculation of the Tonnage of an Eighty Gun Ship.

I. According to the true method.

57 Calculation of the tonnage of the eighty gun ſhip.

	Tons.	lbs.
The weight of the ſhip at her launching draught of water	1593	406
The weight of the furniture	195	720
The weight of the ſhip at her light water mark	1788	1126
The weight of the ſhip at the load water mark	3652	1983
Real burthen	1864	857

II. By the common rule.

			Ft.	Inch.
Length from the foreſide of the ſtem at the height of the hawſe holes, to the aft ſide of the main poſt, at the height of the wing tranſom			185	10
Three-fifths of the extreme breadth is	29 f. 9½ in.			
Height of the wing tranſom is 28 f. 4 in. which multiplied by 2½ inches is	6	8½		
Sum	36	6	36	6
Length of the keel for tonnage			149	4
Extreme breadth			49	8
Product			7416	10½
Half the extreme breadth			24	10
		94)	184185	8½
Burthen according to the common rule			1959	929
Real burthen			1864	857
Difference			95	72

58 The common rule gives the tonnage of ſhips of war greater, and of merchant ſhips leſs, than the truth.

Hence an eighty gun ſhip will not carry the tonnage ſhe is rated at by about 95 tons. As the body of this ſhip is fuller than in ſhips of war in general, there is therefore a nearer agreement between the tonnages found by the two different methods. It may be obſerved that ſhips of war carry leſs tonnage than they are rated at by the common rule, and that moſt merchants ſhips carry

(H) In the merchant ſervice this perpendicular is let fall from the fore ſide of the ſtem at the height of the wing tranſom, by reaſon of the hawſe-holes being generally ſo very high in merchant ſhips, and their ſtems alſo having a great rake forward.

(1) The breadth underſtood in this place is the breadth from outſide to outſide of the plank.

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a great deal more. In confirmation of this, it is thought proper to ſubjoin the dimenſions of ſeveral ſhips, with the tonnage calculated therefrom.

1. *Audacious of ſeventy-four guns.*

Length on the gun deck		168 f.	0 in.
Length of the keel for tonnage		138	0
Extreme breadth		46	9
Depth of the hold		19	9
Launching draught of water	afore	12	0
	abaft	17	4
Load draught of water	afore	20	6
	abaft	21	6
The weight of the ſhip at her launching draught of water		1509 t.	678 lbs.
The weight of the furniture		120	1500
Weight of the ſhip at her light water mark		1629	2178
Weight of the ſhip at her load water mark		2776	498
Real burthen		1146	560

By the common rule.

Length of the keel for tonnage	138 f.	0 in.
Extreme breadth	46	9
Product	6451	6
Half the extreme breadth	23	4½
	94)150803	
Tonnage according to the common rule	1604	643
Real burthen	1146	560
Difference	458	83

2. *An Eaſt Indiaman.*

Length between the perpendiculars forward and aft		132 f.	8 in.
Length of the keel for tonnage		105	0
Extreme breadth		38	0
Depth in hold		16	0
Launching draught of water	afore	7	10
	abaft	11	10
Load draught of water	afore	19	8
	abaft	20	8
The weight of the ſhip at her launching draught of water		602 t.	2116 lbs.
The weight of the furniture		50	124
Weight of the ſhip at her light water mark		653	
Weight of the ſhip at her load water mark		1637	1670
Real burden		984	1670

By the common rule.

Keel for tonnage	105 f.	
Extreme breadth	38	
Product	3999	
Half extreme breadth	19	
	94)75810	
Tonnage	806	1096
Real tonnage	984	1670
Difference	178	574

Tonnage of a Ship.

3. *A Cutter.*

Length of the keel for tonnage		58 f.	0 in.
Extreme breadth		29	0
Launching draught of water	afore	5	10
	abaft	9	8
Load draught of water	afore	9	0
	abaft	12	0
The weight of the cutter at her launching		147 t.	640 lbs.
Weight of the furniture		9	199
Weight of the cutter at her light water mark		156	839
Weight of the cutter at her load water mark		266	1970
Real burthen		110	1131

By the common rule.

Keel for tonnage	58 f.	
Extreme breadth	29	
Product	1682	
Half extreme breadth	14½	
	94)24389	
Tonnage by the common rule	259	1024
Real tonnage	110	1131
Difference	148	2133

The impropriety of the common rule is hence manifeſt, as there can be no dependence on it for aſcertaining the tonnage of veſſels.

We ſhall now ſubjoin the following experimental method of finding the tonnage of a ſhip.

59 Experimental method of determining the tonnage of veſſels.

Conſtruct a model agreeable to the draught of the propoſed ſhip, to a ſcale of about one fourth of an inch to a foot, and let the light and load water lines be marked on it. Then put the model in water, and load it until the ſurface of the water is exactly at the light water line; and let it be ſuſpended until the water drains off, and then weighed. Now ſince the weights of ſimilar bodies are in the triplicate ratio of their homologous dimenſions, the weight of the ſhip when light is, therefore, equal to the product of the cube of the number of times the ſhip exceeds the model by the weight of the model, which is to be reduced to tons. Hence, if the model is conſtructed to a quarter of an inch ſcale, and its weight expreſſed in ounces; then to the conſtant logarithm 0,4893556, add the logarithm of the weight of the model in ounces, and the ſum will be the logarithm of the weight of the ſhip in tons.

Again, the model is to be loaded until the ſurface of the water coincides with the load water line. Now the model being weighed, the weight of the ſhip is to be found by the preceding rule: then the difference between the weights of the ſhip when light and loaded is the tonnage required.

It

Tonnage of a Ship.

It will alſo be worth while to add the following exact rule of Mr Parkins, who was many years foreman of the ſhipwrights in Chatham dockyard.

1. *For Men of War.*

Take the length of the gun-deck from the rabbet of the ſtem to the rabbet of the ſtern-poſt. $\frac{2}{3}\frac{3}{4}$ of this is to be aſſumed as the *length for tonnage*, = L.

Take the extreme breadth from outſide to outſide of the plank; add this to the length, and take $\frac{1}{2}\frac{1}{3}$ of the ſum; call this the *depth for tonnage*, = D.

Set up this height from the limber ſtrake, and at that height take a breadth alſo from outſide to outſide of plank in the timber when the extreme breadth is found, and another breadth in the middle between that and the limber ſtrake; add together the extreme breadth and theſe two breadths, and take $\frac{1}{3}$ of the ſum for the breadth for tonnage, = D.

Multiply L, D, and B together, and divide by 49. The quotient is the burthen in tons.

The following proof may be given of the accuracy of this rule. Column 1. is the tonnage or burthen by the king's meaſurement; col. 2. is the tonnage by this rule; and, col. 3. is the weight actually received on board theſe ſhips at Blackſtakes:

Victory	100 guns.	2162	1839	1840
London	90	1845	1575	1677
Arrogant	74	1614	1308	1314
Diadem	64	1369	1141	965
Adamant	50	1044	870	886
Dolphin	44	879	737	758
Amphion	32	667	554	549
Daphne	20	429	329	374

2. *For Ships of Burthen.*

Take the length of the lower deck from the rabbet of the ſtem to the rabbet of the ſtern-poſt; then $\frac{1}{3}\frac{1}{4}$ of this is the length for tonnage, = L.

Add the length of the lower deck to the extreme breadth from outſide to outſide of plank; and take $\frac{3}{5}\frac{3}{3}$ of the ſum for the depth for tonnage, = D.

Set up that depth from the limber ſtrake, and at this height take a breadth from outſide to outſide. Take another at $\frac{1}{3}$ of this height, and another at $\frac{1}{3}$ of the height. Add the extreme breadth and theſe three breadths, and take the 4th of the ſum for the breadth for tonnage, = B.

Multiply L, D, and B, and divide by $36\frac{1}{3}$. The quotient is the burthen in tons.

This rule reſts on the authority of many ſuch trials, as the following:

	King's Meaſm.	Rule.	Actually rec^{d}. on b^{d}.
Northington Indiaman	676	1053	1064
Granby Indiaman	786	1179	1179
Union coallier	193	266	289
Another coallier	182	254	277

Chap. X. *Of the Scale of Solidity.*

By this ſcale the quantity of water diſplaced by the bottom of the ſhip, for which it is conſtructed, anſwering to a given draught of water, is eaſily obtained; and alſo the additional weight neceſſary to bring her down to the load water line. Scale of Solidity.

In order to conſtruct this ſcale for a given ſhip, it is neceſſary to calculate the quantity of water diſplaced by the keel, and by that part of the bottom below each water line in the draught. Since the areas of the ſeveral water lines are already computed for the eighty gun ſhip laid down in Plates CCCCXC. and CCCCXCI. the contents of theſe parts may hence be eaſily found for that ſhip, and are as follow.

Draught of water.		*Water diſplaced in*	
		Cubic feet.	*tons. lbs.*
Keel and falſe keel	2 f. 3 in.	660.9	21 1855
Diſt. bet. keel and 5th w. line	4 1	8583.1$\frac{3}{4}$	283 1233
Sum	6 4	9243.10$\frac{1}{4}$	305 848
Diſt. 5th and 4th w. line	4 1	18657.8$\frac{11}{48}$	616 828
Sum	10 5	27901.7$\frac{47}{48}$	921 1676
Diſt. 4th and 3d w. line	4 1	23574.6$\frac{17}{48}$	778 1795
Sum	14 6	51476.2$\frac{1}{4}$	1700 1231
Diſt. 3d and 2d w. line	4 1	27812.1$\frac{3}{24}$	918 1775
Sum	18 7	79288.3$\frac{21}{24}$	2619 766
Diſt. 2d and 1ſt w. line	4 1	31285.7$\frac{19}{24}$	1033 1218
Sum	22 8	110573.11$\frac{1}{4}$	3652 1984

Conſtruct any convenient ſcale of equal parts to repreſent tons, as ſcale N° 1. and another to repreſent feet, as N° 2.

Plate CCCCXCII. fig. 60. Conſtruction of the ſcale of ſolidity for the ſhip of eighty guns.

Draw the line AB (fig. 36.) limited at A, but produced indefinitely towards B. Make AC equal to the depth of the keel, 2 feet 3 inches from ſcale N° 2. and through C draw a line parallel to AB, which will repreſent the upper edge of the keel; upon which ſet off C*c* equal to 21 tons 1855 lbs. taken from ſcale N° 1. Again, make AD equal to the diſtance between the lower edge of the keel and the fifth water line, namely, 6 feet 4 inches, and a line drawn through D parallel to AB will be the repreſentation of the lower water line; and make D*b* equal to 305 tons 848 lbs. the correſponding tonnage. In like manner draw the other water lines, and lay off the correſponding tonnages accordingly: then through the points A, *c*, *b*, *e*, *f*, *g*, *h*, draw the curve A *c b e f g h*. Through *h* draw *h* B perpendicular to AB, and it will be the greateſt limit of the quantity of water expreſſed in tons diſplaced by the bottom of the ſhip, or that when ſhe is brought down to the load water line. And ſince the ſhip diſplaces 1788 tons at her light water mark, take therefore that quantity from the ſcale N° 1. which being laid upon AB from A to K, and KL drawn perpendicular to AB, will be the repreſentation of the light

Scale of Solidity.

water line for tonnage. Hence the ſcale will be completed.

61 Uſe of the above ſcale.

Let it now be required to find the number of cubic feet diſplaced when the draught of water is 17 feet, and the number of additional tons neceſſary to bring her down to the load water mark.

Take the given draught of water 17 feet from the ſcale N° 2, which laid from it will reach to I; through which draw the line IMN parallel to AB, and interſecting the curve in AC; then the diſtance IM applied to the ſcale N° 1, will meaſure about 2248 tons, the diſplacement anſwerable to that draught of water; and MN applied to the ſame ſcale will meaſure about 1405 tons, the additional weight neceſſary to bring her down to the load water mark. Alſo the neareſt diſtance between M and the line KL will meaſure about 460 tons, the weight already on board.

It will conduce very much to facilitate this operation to divide KB into a ſcale of tons taken from the ſcale N° 1, beginning at B, and alſo *h* L, beginning at *h*. Then when the draught of water is taken from the ſcale N° 2, and laid from it to I, as in the former example, and IMN drawn parallel to AB, and interſecting the curve in M. Now through M draw a line perpendicular to AB, and it will meet KB in a point repreſenting the number of tons aboard, and alſo *h* L in a point denoting the additional weight neceſſary to load her.

Again, if the weight on board be given, the correſponding draught of water is obtained as follows.

Find the given number of tons in the ſcale KB, through which draw a line perpendicular to AB; then through the point of interſection of this line with the curve draw another line parallel to AB. Now the diſtance between A and the point where the parallel interſected AH being applied to the ſcale N° 2, will give the draught of water required.

Any other caſe to which this ſcale may be applied will be obvious.

BOOK II. *Containing the Properties of Ships*, &c.

CHAP. I. *Of the Equilibrium of Ships.*

SINCE the preſſure of fluids is equal in every direction, the bottom of a ſhip is therefore acted upon by the fluid in which it is immerſed; which preſſure, for any given portion of ſurface, is equal to the product of that portion by the depth and denſity of the fluid: or it is equal to the weight of a column of the fluid whoſe baſe is the given ſurface, and the altitude equal to the diſtance between the ſurface of the fluid and the centre of gravity of the ſurface preſſed. Hence a floating body is in equilibrio between two forces, namely, its gravity and the vertical preſſure of the fluid; the horizontal preſſure being deſtroyed.

Plate CCCCXCIV.

Let ABC (fig. 49.) be any body immerſed in a fluid whoſe line of floatation is GH: hence the preſſure of the fluid is exerted on every portion of the ſurface of the immerſed part AFCH. Let EF, CD be any two ſmall portions contained between the lines ED, FC, parallel to each other, and to the line of floatation GH: then the preſſure exerted upon EF is expreſſed by EF × IK, IK being the depth of EF or CD; the denſity of the fluid being ſuppoſed equal to 1. In like manner the preſſure upon CD is equal to CD × IK. Now ſince the preſſure is in a direction perpendicular to the ſurface, draw therefore the line EL perpendicular to EF, and DM perpendicular to DC, and make each equal to the depth IK, below the ſurface. Now the effort or preſſure of the fluid upon EF will be expreſſed by EF × EL, and that upon CD by CD × DM. Complete the parallelograms ON, QS, and the preſſure in the direction EL is reſolved into EN, EO, the firſt in a horizontal, and the ſecond in a vertical direction. In like manner, the preſſure in the direction DM is reſolved into the preſſures DS, DQ. Hence the joint effect of the preſſures in the horizontal and vertical directions, namely, EF × EN, and EF × EO, will be equal to EF × EL: For the ſame reaſon, CD × DP + CD × DQ = CD × DM. But the parts of the preſſures in a horizontal direction EF × EN, and CD × DP, are equal. For, becauſe of the ſimilar triangles ENL, ERF, and DPM, DSC, we have $\frac{EL}{EN} = \frac{EF}{FR}$ and $\frac{DM}{DP} = \frac{DC}{CS}$: Hence DM × CS = DP × DC, and EL × FR = EN × EF. Now ſince EL = DM, and FR = CS, therefore EL × FR = DM × CS = DP × DC = EN × EF. Hence ſince EF × EN = DP × CD, the effects of the preſſures in a horizontal direction are therefore equal and contrary, and conſequently deſtroy each other.

Equilibrium of Ships.

The preſſure in a vertical direction is repreſented by EO × EF, DQ × DC, &c. which, becauſe of the ſimilar triangles EOL, ERF, and DLM, DSC, become EL × ER, DM × DS, &c. or IK × ER, IK × DS, &c. By applying the ſame reaſoning to every other portion of the ſurface of the immerſed part of the body, it is hence evident that the ſum of the vertical preſſures is equal to the ſum of the correſponding diſplaced columns of the fluid.

62 The weight of a ſhip equal to that of the quantity of water diſplaced.

Hence a floating body is preſſed upwards by a force equal to the weight of the quantity of water diſplaced; and ſince there is an equilibrium between this force and the weight of the body, therefore the weight of a floating body is equal to the weight of the diſplaced fluid (K). Hence alſo the centre of gravity of the body and the centre of gravity of the diſplaced fluid are in the ſame vertical, otherwiſe the body would not be at reſt.

63 And the centre of gravity of both are in the ſame vertical.

CHAP. II. *Upon the Efforts of the Water to bend a Veſſel.*

WHEN it is ſaid that the preſſure of the water upon the immerſed part of a veſſel counterbalances its weight, it is ſuppoſed that the different parts of the veſſel are ſo cloſely connected together, that the forces which act upon its ſurface are not capable of producing any change. For we may eaſily conceive, if the connection of the parts were not ſufficiently ſtrong, the veſſel would run the riſk either of being broken in pieces, or of ſuffering ſome alteration in its figure.

Théorie complette, &c. par Euler, tranſlated by Watſon.

The veſſel is in a ſituation ſimilar to that of a rod AB

(K) Upon this principle the weight and tonnage of the 80 gun ſhip laid down were calculated.

Efforts of the Water to bend a Veſſel.

AB (fig. 50.), which being acted upon by the forces A *a*, C *c*, D *d*, B *b*, may be maintained in equilibrio, provided it has a ſufficient degree of ſtiffneſs: but as ſoon as it begins to give way, it is evident it muſt bend in a convex manner, ſince its middle would obey the forces C *c* and D *d*, while its extremities would be actually drawn downwards by the forces A *a* and B *b*.

The veſſel is generally found in ſuch a ſituation; and ſince ſimilar efforts continually act whilſt the veſſel is immerſed in the water, it happens but too often that the keel experiences the bad effect of a ſtrain. It is therefore very important to inquire into the true cauſe of this accident.

For this purpoſe, let us conceive the veſſel to be divided into two parts by a tranſverſe ſection through the vertical axis of the veſſel, in which both the centre of gravity G (fig. 51.) of the whole veſſel and that of the immerſed part are ſituated: ſo that one of them will repreſent the head part, and the other that of the ſtern, each of which will be conſidered ſeparately. Let *g* be the centre of gravity of the entire weight of the firſt, and *o* that of the immerſed part correſponding. In like manner, let γ be the centre of gravity of the whole after part, and ω that of its immediate portion.

Plate CCCCXCV. Fig. 51.

Now it is plain, that the head will be acted upon by the two forces *g m* and *o n*, of which the firſt will preſs it down, and the latter puſh it up. In the ſame manner, the ſtern will be preſſed down by the force $\gamma\mu$, and puſhed by the force $\omega\nu$. But theſe four forces will maintain themſelves in equilibrium, as well as the total forces reunited in the points G and O, which are equivalent to them; but whilſt neither the forces before nor thoſe behind fall in the ſame direction, the veſſel will evidently ſuſtain efforts tending to bend the keel upwards, if the two points *o* ω are nearer the middle than the two other forces *g m* and $\gamma\mu$. A contrary effect would happen if the points *o* and ω were more diſtant from the middle than the points *g* and γ.

64 The cauſe of a ſhip's hogging,

65 and ſagging.

But the firſt of theſe two cauſes uſually takes place almoſt in all veſſels, ſince they have a greater breadth towards the middle, and become more and more narrow towards the extremities; whilſt the weight of the veſſel is in proportion much more conſiderable towards the extremities than at the middle. From whence we ſee, that the greater this difference becomes, the more alſo will the veſſel be ſubject to the forces which tend to bend its keel upwards. It is therefore from thence that we muſt judge how much ſtrength it is neceſſary to give to this part of the veſſel, in order to avoid ſuch a conſequence.

If other circumſtances would permit either to load the veſſel more in the middle, or to give to the part immerſed a greater capacity towards the head and ſtern, ſuch an effect would no longer be apprehended. But the deſtination of moſt veſſels is entirely oppoſite to ſuch an arrangement: by which means we are obliged to ſtrengthen the keel as much as may be neceſſary, in order to avoid ſuch a diſaſter.

We ſhall conclude this chapter with the following practical obſervations on the hogging and ſagging of ſhips by Mr Hutchinſon of Liverpool:

Practical Seamanſhip, p. 13.

"When ſhips with long floors happen to be laid a-dry upon mud or ſand, which makes a ſolid reſiſtance againſt the long ſtraight floors amidſhips, in compariſon with the two ſharp ends, the entrance and run meet with little ſupport, but are preſſed down lower than the flat of the floor, and in proportion hogs the ſhip amidſhips; which is too well known from experience to occaſion many total loſſes, or do ſo much damage by hogging them, as to require a vaſt deal of trouble and expence to ſave and repair them, ſo as to get the hog taken out and brought to their proper ſheer again: and to do this the more effectually, the owners have often been induced to go to the expence of lengthening them; and by the common method, in proportion as they add to the burden of theſe ſhips, by lengthening their too long ſtraight floors in their main bodies amidſhips, ſo much do they add to their general weakneſs to bear hardſhips either on the ground or afloat; for the ſcantling of their old timber and plank is not proportionable to bear the additional burden that is added to them.

Efforts of the Water to bend a Veſſel.

"But defects of this kind are beſt proved from real and inconteſtable facts in common practice. At the very time I was writing upon this ſubject, I was called upon for my advice by the commander of one of thoſe ſtrong, long, ſtraight floored ſhips, who was in much trouble and diſtraction of mind for the damage his ſhip had taken by the pilot laying her on a hard, gentle ſloping ſand, at the outſide of our docks at Liverpool, where it is common for ſhips that will take the ground to lie for a tide, when it proves too late to get into our wet docks. After recommending a proper ſhip carpenter, I went to the ſhip, which lay with only a ſmall keel, yet was greatly hogged, and the butts of her upper works ſtrained greatly on the lee ſide; and the ſeams of her bottom, at the lower futtock heads, vaſtly opened on the weather ſide: all which ſtrained parts were agreed upon not to be caulked, but filled with tallow, putty, or clay, &c. with raw bullocks hides, or canvas nailed with battons on her bottom, which prevented her ſinking with the flow of the tide, without hindering the preſſure of water from righting and cloſing the ſeams again as ſhe floated, ſo as to enable them to keep her free with pumping. This veſſel, like many other inſtances of ſhips of this conſtruction that I have known, was ſaved and repaired at a very great expence in our dry repairing docks. And that their bottoms not only hog upwards, but ſag (or curve) downwards, to dangerous and fatal degrees, according to the ſtrain or preſſure that prevails upon them, will be proved from the following facts:

"It has been long known from experience, that when ſhips load deep with very heavy cargoes or materials that are ſtowed too low, it makes them ſo very labourſome at ſea, when the waves run high, as to roll away their maſts; and after that misfortune cauſes them to labour and roll the more, ſo as to endanger their working and ſtraining themſelves to pieces: to prevent which, it has been long a common practice to leave a great part of their fore and after holds empty, and to ſtow them as high as poſſible in the main body at midſhips, which cauſes the bottoms of theſe long ſtraight-floored ſhips to ſag downwards, in proportion as the weight of the cargo ſtowed there exceeds the preſſure of the water upwards, ſo much as to make them dangerouſly and fatally leaky.

"I have known many inſtances of thoſe ſtrong ſhips of 500 or 600 tons burdens built with long ſtraight floors, on the eaſt coaſt of England, for the coal and timber trade, come loaded with timber from the Baltic

to

Efforts of the Water to bend a Veſſel.

to Liverpool, where they commonly load deep with rock ſalt, which is too heavy to fill their holds, ſo that for the above reaſons they ſtowed it high amidſhips, and left large empty ſpaces in their fore and after holds, which cauſed their long ſtraight floors to ſag downwards, ſo much as to make their hold ſtaunchions amidſhips, at the main hatchway, ſettle from the beams three or four inches, and their mainmaſts ſettle ſo much as to oblige them to ſet up the main rigging when rolling hard at ſea, to prevent the maſts being rolled away; and they were rendered ſo leaky as to be obliged to return to Liverpool to get their leaks ſtopped at great expence. And in order to ſave the time and expence in diſcharging them, endeavours were made to find out and ſtop their leaks, by laying them aſhore dry on a level ſand; but without effect: for though their bottoms were thus ſagged down by their cargoes when afloat, yet when they came a-dry upon the ſand, ſome of their bottoms hogged upwards ſo much as to raiſe their mainmaſts and pumps ſo high as to tear their coats from their decks; ſo that they have been obliged to diſcharge their cargoes, and give them a repair in the repairing dock, and in ſome to double their bottoms, to enable them to carry their cargoes with ſafety, ſtowed in this manner. From this cauſe I have known one of theſe ſtrong ſhips to founder.

"Among the many inſtances of ſhips that have been diſtreſſed by carrying cargoes of lead, one ſailed from hence bound to Marſeilles, which was ſoon obliged to put back again in great diſtreſs, having had four feet water in the hold, by the commander's account, owing to the ſhip's bottom ſagging down to ſuch a degree as made the hold ſtaunchions ſettle ſix inches from the lower deck beams amidſhips; yet it is common with theſe long ſtraight floored ſhips, when theſe heavy cargoes are diſcharged that make their bottoms ſag down, then to hog upwards: ſo that when they are put into a dry repairing dock, with empty holds, upon ſtraight blocks, they commonly either ſplit the blocks cloſe fore and aft, or damage their keels there, by the whole weight of the ſhip lying upon them, when none lies upon the blocks under the flat of their floors amidſhips, that being hogged upwards; which was the caſe of this ſhip's bottom; though ſagged downwards ſix inches by her cargo, it was now found hogged ſo much that her keel did not touch the blocks amidſhips, which occaſioned ſo much damage to the after part of the keel, as to oblige them to repair it; which is commonly the caſe with theſe ſhips, and therefore deſerving particular notice."

In order to prevent theſe defects in ſhips, "they ſhould all be built with their floors or bottoms lengthwiſe, to form an arch with the projecting part downwards, which will naturally not only contribute greatly to prevent their taking damage by their bottoms hogging and ſtraining upwards, either aground or afloat, as has been mentioned, but will, among other advantages, be a help to their ſailing, ſteering, ſtaying, and waring."

CHAP. III. *Of the Stability of Ships.*

WHEN a veſſel receives an impulſe or preſſure in a horizontal direction, ſo as to be inclined in a ſmall degree, the veſſel will then either regain its former poſition as the preſſure is taken off, and is in this caſe ſaid to be poſſeſſed of ſtability; or it will continue in its inclined ſtate; or, laſtly, the inclination will increaſe until the veſſel is overturned. With regard to the firſt caſe, it is evident that a ſufficient degree of ſtability is neceſſary in order to ſuſtain the efforts of the wind; but neither of the other two caſes muſt be permitted to have place in veſſels. Stability of Ships.

Let CED (fig. 52.) be the ſection of a ſhip paſſing through its centre of gravity, and perpendicular to the ſheer and floor plans; which let be in equilibrium in a fluid; AB being the water line, G the centre of gravity of the whole body, and *g* that of the immerſed part AEB. Let the body receive now a very ſmall inclination, ſo that *a* E *b* becomes the immerſed part, and γ its centre of gravity. From γ draw γ M perpendicular to *a b*, and meeting *g* G, produced, if neceſſary, in M. If, then, the point M thus found is higher than G the centre of gravity of the whole body, the body will, in this caſe, return to its former poſition, the preſſure being taken off. If the point M coincides with G, the veſſel will remain in its inclined ſtate; but if M be below G, the inclination of the veſſel will continually increaſe until it is entirely overſet. Fig. 52.

The point of interſection M is called the *metacenter*, and is the limit of the altitude of the centre of gravity of the whole veſſel. Whence it is evident, from what has already been ſaid, that the ſtability of the veſſel increaſes with the altitude of the metacenter above the centre of gravity: But when the metacenter coincides with the centre of gravity, the veſſel has no tendency whatever to move out of the ſituation into which it may be put. Thus, if the veſſel be inclined either to the right or left ſide, it will remain in that poſition until a new force is impreſſed upon it: in this caſe, therefore, the veſſel would not be able to carry ſail, and is hence unfit for the purpoſes of navigation. If the metacenter is below the common centre of gravity, the veſſel will inſtantly overſet.

As the determination of the metacenter is of the utmoſt importance in the conſtruction of ſhips, it is therefore thought neceſſary to illuſtrate this ſubject more particularly.

Let AEB (fig. 52.) be a ſection of a ſhip perpendicular to the keel, and alſo to the plane of elevation, and paſſing through the centre of gravity of the ſhip, and alſo through the centre of gravity of the immerſed part, which let be *g*.

Now let the ſhip be ſuppoſed to receive a very ſmall inclination, ſo that the line of floatation is a, *b*, and γ the centre of gravity of the immerſed part *a* E *b*. From γ draw γ M perpendicular to *a b*, and interſecting GM in M, the metacenter, as before. Hence the preſſure of the water will be in the direction γ M.

In order to determine the point M, the metacenter, the poſition of γ with reſpect to the lines AB and *g* G, muſt be previouſly aſcertained. For this purpoſe, let the ſhip be ſuppoſed to be divided into a great number of ſections by planes perpendicular to the keel, and parallel to each other, and to that formerly drawn, theſe planes being ſuppoſed equidiſtant. Let AEB (fig. 53.) be one of theſe ſections, *g* the centre of gravity of the immerſed part before inclination, and γ the centre of gravity of the immerſed part when the ſhip is in its inclined ſtate; the diſtance *g* γ between the two centres Fig. 53.

of

Stability of Ships.

of gravity in each section is to be found. Let AB be the line of floatation of the ship when in an upright state, and *a b* the water line when inclined. Then, because the weight of the ship remains the same, the quantity of water displaced will also be the same in both cases, and therefore AEB=*a* E *b*, each sustaining the same part of the whole weight of the ship. From each of these take the part AE*b*, which is common to both, and the remainders AO*a*, BO*b* will be equal; and which, because the inclination is supposed very small, may be considered as rectilineal triangles, and the point O the middle of AB.

Now, let H, I, K, be the centres of gravity of the spaces AO*a*, AE*b*, and BO*b*, respectively. From these points draw the lines H*h*, I*i*, and K*k*, perpendicular to AB, and let IL be drawn perpendicular to EO. Now to ascertain the distance γq of the centre of gravity γ of the part *a* E*b* from the line AB, the momentum of *a* E*b* with respect to this line must be put equal to the difference of the momentums of the parts AE*b*, AO*a*, which are upon different sides of AB *. Hence *a* E*b* $\times \gamma q$, or AEB $\times \gamma q$ = AE*b* $\times$ I*i* — AO*a* $\times$ H*h*. But since *g* is the common centre of gravity of the two parts AE*b*, BO*b*, we have therefore AEB $\times g$ O = AE*b* $\times$ I*i* + BO*b* $\times$ K*k*. Hence by expunging the term AE*b* $\times$ I*i* from each of these equations, and comparing them, we obtain AEB $\times \gamma q$ = AEB $\times g$ O — BO*b* $\times$ K*k* — AO*a* $\times$ H*h*.

* *Bezout's Mechanique*, art. 203.

Now, since the triangles AO*a*, BO*b*, are supposed infinitely small, their momentums or products, by the infinitely little lines H*h*, K*k*, will also be infinitely small with respect to AEB $\times g$ O; which therefore being rejected, the former equation becomes AEB $\times \gamma q$ = AEB $\times g$ O, and hence $\gamma q = g$ O. Whence the centres of gravity γ, *g*, being at equal distances below AB, the infinitely little line γg is therefore perpendicular to EO. For the same reason $g\gamma$, fig. 52. may be considered as an arch of a circle whose centre is M.

To determine the value of $g\gamma$, the momentum of *a* E*b* with respect to EO must be taken, for the same reason as before, and put equal to the momentums of the two parts AO*a*, AE*b*; and we shall then have *a* E*b* $\times g\gamma$, or AEB $\times g\gamma$ = AEB $\times$ IL + AO*a* $\times$ O*h*. But since *g* is the common centre of gravity of the two spaces AE*b*, BO*b*, we shall have AE*b* $\times$ IL — BO*b* $\times$ O*k* = O, or AE*b* $\times$ IL = BO*b* $\times$ O*k*. Hence AEB $\times g\gamma$ = BO*b* $\times$ O*k* + AO*a* $\times$ O*h* = 2 BO*b* $\times$ O*k*; because the two triangles AO*a*, BO*b* are equal, and that the distances O*k*, O*h*, are also evidently equal.

Let x be the thickness of the section represented by ABC. Then the momentum of this section will be 2 BO*b* $\times x \times$ O*k*, which equation will also serve for each particular section.

Now let $\int$ represent the sum of the momentums of all the sections. Hence $\int$ AEB $\times x \times g\gamma = \int$ 2. BO*b* $\times x \times$ O*k*. Now the first member being the sum of the momentums of each section, in proportion to a plane passing through the keel, ought therefore to be equal to the sum of all the sections, or to the volume of the immersed part of the bottom multiplied by the distance $g\gamma$. Hence V representing the volume, we shall have $V \times g\gamma = \int$ 2 BO*b* $\times x$ O*k*.

In order to determine the value of the second member of this equation, it may be remarked, that when the ship is inclined, the original plane of floatation CBPQ (fig. 54.) becomes C*b p* Q. Now the triangles NI*n*, BO*b*, being the same as those in figures 52. and 53.; and as each of these triangles has one angle equal, they may, upon account of their infinite smallness, be considered as similar; and hence BO*b* : NI*n* :: $\overline{OB}|^3$: $\overline{IN}|^3$; whence BO*b* = $\frac{\overline{OB}|^3}{\overline{IN}|^3} \times$ NI*n*. Moreover, we have (fig. 53.) O*k* = $\frac{2}{3}$ OB, for the points K and *k* may be considered as equidistant from the point O; whence BO*b* $\times$ O*k* = $\frac{\frac{2}{3}\overline{OB}|^3}{\overline{IN}|^3} \times$ NI*n*.

Stability of Ships. Fig. 54.

Hence $V \times g\gamma = \int, \frac{\frac{1}{3}\overline{OB}|^3}{\overline{IN}|^3} \times x \times$ NI*n*. From this equation the value of $g\gamma$ is obtained.

To find the altitude *g*M (fig. 55.) of the meta-center above the centre of gravity of the immersed part of the bottom, let the arc NS be described from the centre I with the radius IN; then NI*n* = $\frac{IN \times NS}{2}$. Now since the two straight lines γM, *g*M are perpendicular to *a n* and AN respectively, the angles M and NI*n* are therefore equal: and the infinitely little portion $g\gamma_1$ which is perpendicular to *g* M, may be considered as an arch described from the centre M. Hence the two sectors NIS, *g* M γ are similar; and therefore *g* M : $g\gamma$:: IN : NS. Hence NS = $\frac{IN \times g\gamma}{g\,M}$; and consequently NI*n* = $\frac{\overline{IN}|^3 \times g\gamma}{2\,g\,M}$. Now this being substituted in the former equation, and reduced, we have $V \times g\gamma = \int \frac{\frac{1}{3}\overline{OB}|^3 \times x \times g\gamma}{g\,M}$. But since *g* M and $g\gamma$ are the same, whatever section may be under consideration, the equation may therefore be expressed thus, $V \times g\gamma = \frac{\frac{2}{3}g\gamma}{g\,M} \cdot \int, \overline{OB}|^3 \times x$. Hence *g* M = $\frac{\frac{2}{3}\int, \overline{OB}|^3 \times x}{V}$. Let y = OB, and the equation becomes *g* M = $\frac{\frac{2}{3}\int, y^3 x}{V}$.

Fig. 55.

Whence to have the altitude of the metacenter above the centre of gravity of the immersed part of the bottom, the length of the section at the water-line must be divided by lines perpendicular to the middle line of this section into a great number of equal parts, so that the portion of the curve contained between any two adjacent perpendiculars may be considered as a straight line. Then the sum of the cubes of the half perpendiculars or ordinates is to be multiplied by the distance between the perpendiculars, and two-thirds of the product is to be divided by the volume of the immersed part of the bottom of the ship.

It is hence evident, that while the sector at the water line is the same, and the volume of the immersed part of the bottom remains also the same, the altitude of the metacenter will remain the same, whatever may be the figure of the bottom.

Chap. IV. *Of the Centre of Gravity of the immersed Part of the Bottom of a Ship.*

The centre of gravity * of a ship, supposed homogeneous, and in an upright position in the water, is in a vertical

* See *Mechanics.*

Centre of Gravity.

vertical section passing through the keel, and dividing the ship into two equal and similar parts, at a certain distance from the stern, and altitude above the heel.

In order to determine the centre of gravity of the immersed part of a ship's bottom, we must begin with determining the centre of gravity of a section of the ship parallel to the keel, as ANDFPB (fig. 56.), bounded by the parallel lines AB, DF, and by the equal and similar curves AND, BPF. Fig. 56.

66 Distance of the centre of gravity from the stem or stern.

If the equation of this curve were known, its centre of gravity would be easily found: but as this is not the case, let therefore the line CE be drawn through the middle C, E, of the lines AB, DF, and let this line CE be divided into so great a number of equal parts by the perpendiculars TH, KM, &c. that the arches of the curves contained between the extremities of any two adjacent perpendiculars may be considered as straight lines. The momentums of the trapeziums DTHF, TKMH, &c. relative to the point E, are then to be found, and the sum of these momentums is to be divided by the sum of the trapeziums, that is, by the surface ANDFPB.

The distance of the centre of gravity of the trapezium THFD from the point E is $= \frac{\frac{1}{3}IE \times (DF + 2TH)}{DF + TH}$ *.

* *Bezout's Mechanique*, art. 279.

For the same reason, and because of the equality of the lines IE, IL, the distance of the centre of gravity of the trapezium TKMH from the same point E will be $\frac{\frac{1}{3}IE \times (TH + 2KM)}{TH + KM} + IE$, or $= \frac{\frac{1}{3}IE \times (4TH + 5KM)}{TH + KM}$.

In like manner, the distance of the centre of gravity of the trapezium NKMP from the point E will be $\frac{\frac{1}{3}IE \times (KM + 2NP)}{KM + NP} + 2\,IE$, or $\frac{\frac{1}{3}IE \times (7KM + 8NP)}{KM + NP}$, &c.

Now, if each distance be multiplied by the surface of the corresponding trapezium, that is, by the product of half the sum of the two opposite sides of the trapezium into the common altitude IE, we shall have the momentums of these trapeziums, namely, $\frac{1}{6}\overline{IE}|^2 \times (DF + 2TH)$, $\frac{1}{6}\overline{IE}|^2 \times (4\,TH + 5\,KM)$ $\frac{1}{6}\overline{IE}|^2 \times (7\,KM + 8\,NP)$, &c. Hence the sum of these momentums will be $\frac{1}{6}\overline{IE}|^2 \times (DF + 6\,TH + 12\,KM + 18\,NP + 24\,QS + 14\,AB)$. Whence it may be remarked, that if the line CE be divided into a great number of equal parts, the factor or coefficient of the last term, which is here 14, will be $= 2 + 3\,(n-2)$ or $3n-4$, n being the number of perpendiculars. Thus the general expression of the sum of the momentums is reduced to $\overline{IE}|^2 \times (\frac{1}{6}\,DF + TH + 2\,KM + 3\,NP + 4\,QS +, \&c. - + \frac{3n-4}{6} \times AB$.

The area of the figure A N D F P B is equal to $IE \times (\frac{1}{2}\,DF + TH + KM + NP +, \&c. \ldots\ldots + \frac{1}{2}\,AB)$; hence the distance EG of the centre of gravity G from one of the extreme ordinates D F is equal to

$$\frac{IE \times (\frac{1}{6}DF + TH + 2\,KM + 3\,NP +, \&c. \frac{3n-4}{6} \times AB)}{\frac{1}{2}\,DF + IH + KM + NP +, \&c. + \frac{1}{2}\,AB}$$

67 Rule for the distance of the centre of gravity from one of the extreme ordinates.

Whence the following rule to find the distance of the centre of gravity G from one of the extreme ordinates DF. To the sixth of the first ordinate add the fifth of the last ordinate multiplied by three times the number of ordinates minus four; then the second ordinate, twice the third, three times the fourth, &c. the sum will be a first term. Then to half the sum of the extreme ordinates add all the intermediate ones, and the sum will be a second term. Now the first term divided by the second, and the quotient multiplied by the interval between two adjacent perpendiculars, will be the distance sought. Centre of Gravity.

Thus, let there be seven perpendiculars, whose values are 18, 23, 28, 30, 30, 21, 0, feet respectively, and the common interval between the perpendiculars 20 feet. Now the sixth of the first term 18 is 3; and as the last term is 0, therefore to 3 add 23, twice 28 or 56, thrice 30 or 90, four times 30 or 120, five times 21 or 105; and the sum is 397. Then to the half of 18+0, or 9, add the intermediate ordinates, and the sum will be 141. Now $\frac{397 \times 20}{141}$, or $\frac{7940}{141}$, $= 59$ feet four inches nearly, the distance of the centre of gravity from the first ordinate.

Now, when the centre of gravity of any section is determined, it is easy from thence to find the centre of gravity of the solid, and consequently that of the bottom of a ship.

68 Height of the centre of gravity above the keel.

The next step is to find the height of the centre of gravity of the bottom above the keel. For this purpose the bottom must be imagined to be divided into sections by planes parallel to the keel or water-line, (figs. 57, 58.). Then the solidity of each portion contained between two parallel planes will be equal to half the sum of the two opposed surfaces multiplied by the distance between them; and its centre of gravity will be at the same altitude as that of the trapezium *a b c d*, (fig. 58.), which is in the vertical section passing through the keel. It is hence obvious, that the same rule as before is to be applied to find the altitude of the centre of gravity, with this difference only, that the word perpendicular or ordinate is to be changed into section. Hence the rule is, to the sixth part of the lowest section add the product of the sixth part of the uppermost section by three times the number of sections minus four; the second section in ascending twice the third, three times the fourth, &c. the sum will be a first term. To half the sum of upper and lower sections add the intermediate ones, the sum will be a second term. Divide the first term by the second, and the quotient multiplied by the distance between the sections will give the altitude of the centre of gravity above the keel. Fig. 57, 58.

With regard to the centre of gravity of a ship, whether it is considered as loaded or light, the operation becomes more difficult. The momentum of every different part of the ship and cargo must be found separately with respect to a horizontal and also a vertical plane. Now the sums of these two momentums being divided by the weight of the ship, will give the altitude of the centre of gravity, and its distance from the vertical plane; and as this centre is in a vertical plane passing through the axis of the keel, its place is therefore determined. In the calculation of the momentums, it must be observed to multiply the weight, and not the magnitude of each piece, by the distance of its centre of gravity.

A more easy method of finding the centre of gravity of

Centre of Gravity.

69 A mechanical method for aſcertaining the centre of gravity of a ſhip.

of a ſhip is by a mechanical operation, as follows: Conſtruct a block of as light wood as poſſible, exactly ſimilar to the parts of the propoſed draught or ſhip, by a ſcale of about one-fourth of an inch to a foot. The block is then to be ſuſpended by a ſilk-thread or very fine line, placed in different ſituations until it is found to be in a ſtate of equilibrium, and the centre of gravity will be pointed out. The block may be proved by faſtening the line which ſuſpends it to any point in the line joining the middles of the ſtem and poſt, and weights are to be ſuſpended from the extremities of this middle line at the ſtem and poſt. If, then, the block be properly conſtructed, a plane paſſing through the line of ſuſpenſion, and the other two lines, will alſo paſs through the keel, ſtem, and poſt. Now, the block being ſuſpended in this manner from any point in the middle line, a line is to be drawn on the block parallel to the line of ſuſpenſion, ſo that the plane paſſing through theſe two lines may be perpendicular to the vertical plane of the ſhip in the direction of the keel. The line by which the block is ſuſpended is then to be removed to ſome other convenient point in the middle line; and another line is to be drawn on the block parallel to the line ſuſpending it, as before. Then the point of interſection of this line with the former will give the poſition of the centre of gravity on the block, which may now be laid down in the draught. Centre of Gravity.

CHAP. V. *Application of the preceding Rules to the Determination of the Centre of Gravity and the Height of the Metacenter above the Centre of Gravity of a Ship of 74 Guns.*

IN fig. 59. are laid down the ſeveral ſections in a horizontal direction, by planes parallel to the keel, and at equal diſtances from each other, each diſtance being 10 feet 0 inches 4 parts. Fig. 59.

I. *Determination of the Centre of Gravity of the upper Horizontal Section.*

To find the diſtance of the centre of gravity of the plane 8 *g o* G from the firſt ordinate 8 *g*.

Ordinates. Feet.	In.	P.	Double Ord. Feet.	In.	P.	1ſt Factors	1ſt Products. Fect.	In.	P.	2d Factors.	2d Products, Feet.	In.	P.
14	9	0	29	6	0	$0\frac{1}{6}$	4	11	0	$0\frac{1}{6}$	14	9	0
17	1	6	34	3	0	1	34	3	0	1	34	3	0
18	9	0	37	6	0	2	75	0	0	1	37	6	0
19	10	0	39	8	0	3	119	0	0	1	39	8	0
20	7	6	41	3	0	4	165	0	0	1	41	3	0
21	1	9	42	3	6	5	211	5	6	1	42	3	6
21	6	3	43	0	6	6	258	3	0	1	43	0	6
21	7	9	43	3	6	7	303	0	6	1	43	3	6
21	7	9	43	3	6	8	346	4	0	1	43	3	6
21	7	6	43	3	0	9	389	3	0	1	43	3	0
21	4	0	42	8	0	10	426	8	0	1	42	8	0
20	10	6	41	9	0	11	459	3	0	1	41	9	0
19	9	0	39	6	0	12	474	0	0	1	39	6	0
17	4	6	34	9	0	13	451	9	0	1	34	9	0
13	1	3	26	2	6	$\left((3\times 15)-4\right)\times\frac{1}{6}$	179	1	1	$0\frac{1}{2}$	13	1	3
291	1	3	582	2	6		3897	3	1		554	4	3

Now $\frac{3897\ 3\ 1}{554\ 4\ 3}\times 10\ \ 0\ \ 4=\frac{3897\cdot 25}{554\cdot 25}\times 10.03=70.5$.

	Feet
Hence the diſtance of the centre of gravity of double the plane 8 *g o* G from the firſt ordinate, 8 *g*, is	70.5
Diſtance of this ordinate from the aft ſide of ſtern-poſt,	13.5
Diſtance of the centre of gravity from the aft ſide of poſt,	84.0
Diſtance of the centre of gravity of double the trapezium AR *g* 8 from its ordinate AR,	8.42
Diſtance of this ordinate from the aft ſide of the ſtern-poſt,	0.58
Diſtance of the centre of gravity of this plane from the aft-ſide of the ſtern-poſt	9.0
Diſtance of the centre of gravity of double the trapezium G *o γ γ* from its ordinate G *o*,	5.44
Diſtance of this ordinate from the aft-ſide of the poſt,	153.78
Diſtance of the centre of gravity of this trapezium from the aft ſide of the poſt,	159.22
Diſtance of the centre of gravity of the ſection of the ſtern-poſt from the aft part of the poſt,	0.29
Diſtance of the centre of gravity of the ſection of the ſtern from the aft ſide of the poſt,	169.76

Centre of Gravity.

The areas of these several planes, calculated by the common method, will be as follow:

Centre of Gravity.

5558.90 for that of the plane, and its momentum 5558.9×84	=	466947.6000
199.13 for that of double the trapezium ARg8, and its momentum 199.13×9	=	1792.1700
214.59 for that of double the trapezium G$o\gamma\gamma$, and its momentum 214.59×159.22	=	34167.0236
0.77 for that of the section of the stern-post, and its momentum 0.77×0.29	=	0.2233
0.77 for that of the section of the stem, and its momentum 0.77×169.76	=	130.7152
5974.16 Sum		503037.7321

Now $\frac{503037.7321}{5974.16} = 84.2$, the distance of the centre of gravity of the whole section from the aft side of the stern-post.

II. *Determination of the Centre of Gravity of the second Horizontal Section.*

To find the distance of the centre of gravity of double the plane 8$f n$G from its first ordinate 8f.

Ordinates.			Double Ord.			1. Factors.	1. Products.			2. Fact.	2. Products.		
Feet.	In.	Pts.	Feet	In.	Pts.		Feet	In.	Pts.		Feet	In.	Pts.
11	2	3	22	4	6	$0\frac{1}{6}$	3	8	9	$0\frac{1}{2}$	11	2	3
15	3	0	30	6	0	1	30	6	0	1	30	6	0
17	5	0	34	10	0	2	69	8	0	1	34	10	0
18	10	3	37	8	6	3	113	1	6	1	37	8	6
19	10	6	39	9	0	4	159	0	0	1	39	9	0
20	7	0	41	2	0	5	205	10	0	1	41	2	0
21	0	3	42	0	6	6	252	3	0	1	42	0	6
21	2	0	42	4	0	7	296	4	0	1	42	4	0
21	0	6	42	1	0	8	336	8	0	1	42	1	0
20	10	9	41	9	6	9	376	1	6	1	41	9	6
20	6	6	41	1	0	10	410	10	0	1	41	1	0
19	10	0	39	8	0	11	436	4	0	1	39	8	0
18	6	0	37	0	0	12	444	0	0	1	37	0	0
15	9	6	31	7	0	13	410	7	0	1	31	7	0
11	2	9	22	5	6	$\left((3 \times 15) - 4\right) \times \frac{1}{6}$	153	5	6	$0\frac{1}{2}$	11	2	9
273	2	3	546	4	6		3698	5	3		523	11	6

Hence the distance of the centre of gravity of double the plane 8$f n$G from its first ordinate 8n is

$\frac{3698\ 5\ 3}{523\ 11\ 6} \times 10.0.4 = \frac{3698.43}{523.95} \times 10.03 =$ - - - 70.79

Distance of this ordinate from the aft side of the stern-post - - 13.5

Distance of the centre of gravity of the above plane from the aft side of post - - 84.29

Distance of the centre of gravity of double the trapezium ARf8 from its ordinate AR - 8.38

Distance of this ordinate from aft side of stern-post - - - 0.57

Distance of the centre of gravity of the trapezium from the aft side of the post - - 8.95

Distance of the centre of gravity of the trapezium before the ordinate Gn from that ordinate 5.74

Distance of that ordinate from the aft side of the post - - - 153.78

Distance of the centre of gravity of the trapezium from the aft side of the post - - 159.52

Distance of the centre of gravity of the section of the stern-post from the aft side of the post - 0.29

Distance of the centre of gravity of the section of the stem from the aft side of the post - 169.76

The

Centre of Gravity.

The areas of these several planes being calculated, will be as follow:

Centre of Gravity.

5255.22	for that of the plane 8 *f n* G, and its momentum 5255.22 × 84.29 =	442962.4938
153.11	for that of double the trapezium AR *f* 8, and its momentum 153.11 × 8.95 =	1370.3345
182.40	the area of the trapezium before, and its momentum 182.40 × 159.52 =	29096.4480
0.77	the area of the section of the sternpost, and its momentum 0.77 × 0.29 =	0.2233
0.77	the area of the section of the stem, and its momentum 0.77 × 169.76 =	130.7152
5592.27	Sum	473560.2148

Now $\frac{473560.2148}{5952.27} = 84.68$, the distance of the centre of gravity of the whole section from the aft-side of the stern-post.

III. *Determination of the Centre of Gravity of the third Horizontal Section.*

Distance of the centre of gravity of double the plane 8 *e m* G from its first ordinate 8 *e*.

Ordinates. Feet.	In.	Pts.	Double Ord. Feet.	In.	Pts.	1st Factors.	1st Products. Feet.	In.	Pts.	2d Fact.	2d Products. Feet.	In.	Pts.
6	7	6	13	3	0	$0\frac{1}{6}$	2	2	6	$0\frac{1}{2}$	6	7	6
11	7	6	23	3	0	1	23	3	0	1	23	3	0
15	1	0	30	2	0	2	60	4	0	1	30	2	0
17	1	3	34	2	6	3	102	7	6	1	34	2	6
18	3	0	36	6	0	4	146	0	0	1	36	6	0
19	3	0	38	6	0	5	192	6	0	1	38	6	0
19	9	0	39	6	0	6	237	0	0	1	39	6	0
20	0	0	40	0	0	7	280	0	0	1	40	0	0
20	0	0	40	0	0	8	320	0	0	1	40	0	0
19	8	3	39	4	6	9	354	4	6	1	39	4	6
19	1	3	38	2	6	10	382	1	0	1	38	2	6
18	1	0	36	2	0	11	397	10	0	1	36	2	0
16	3	9	32	7	6	12	391	6	0	1	32	7	6
13	2	3	26	4	6	13	342	10	6	1	26	4	6
8	4	6	16	9	0	$\left((3\times 15)-4\right)\times\frac{1}{6}$	114	5	6	$0\frac{1}{2}$	8	4	6
242	5	3	484	10	6		3347	0	6		469	10	6

Hence the distance of the centre of gravity of double the plane 8 *e m* G from its first ordinate 8 *e* is =

$\frac{3347\ 0\ 6}{469\ 10\ 6} \times 10\ 0\ 4 = \frac{3347.04}{469.87} \times 10.03 =$ - - - 71.44

Distance of this ordinate from the aft side of the post - - - 13.5

Hence the distance of the centre of gravity of this plane from the aft side of the post is - 84.94

Distance of the centre of gravity of double the trapezium AR *e* 8, from its ordinate AR - 8.03

Distance of this ordinate from the aft side of the post - - - - 0.58

Distance of the centre of gravity of this trapezium from the aft side of the post - 8.61

Distance of the centre of gravity of the foremost trapezium from its ordinate G *m* - 5.19

Distance of this ordinate from the aft side of the post - - - 153.78

Distance of the centre of gravity of this trapezium from the aft side of the post - 158.97

Distance of the centre of gravity of the section of the post from the aft side of the post - 0.29

Distance of the centre of gravity of the section of the stem from the aft side of the post - 169.76

The

Centre of Gravity.

The areas of these several planes will be found to be as follows:

Centre of Gravity.

4712.7961	for that of double the plane 8 *e m* G, and its momentum 4712.7961 × 84.94 =	400304.9007
93.84	the area of double the trapezium AR 3 *e* 88, and its momentum 93.84 × 8.61 =	807.9624
131.1	for the area of foremost trapezium, and its momentum 131.1 × 158.97 =	20840.967
0.77	the area of the section of the post, and its momentum 0.77 × 0.29 =	0.2233
0.77	the area of the section of the stem, and its momentum 0.77 × 169.76 =	130.7152
4939.2761	Sum	422084.7706

Now $\frac{422084.7706}{4939.2761} = 85.45$, the distance of the centre of gravity of the whole section from the aft side of the post.

IV. *Determination of the Centre of Gravity of the Fourth Horizontal Section.*

Distance of the centre of gravity of double the plane 8 *d l* G from its first ordinate 8 *d*.

Ordinates. Feet. In. Pts.	Double Ord. Feet. In. Pts.	1. Factors.	1. Products. Feet. In. Pts.	2. Fact.	2. Products. Feet. In. Pts.
3 3 6	6 7 0	$0\frac{1}{6}$	1 1 2	$0\frac{1}{2}$	3 3 6
7 9 0	15 6 0	1	15 6 0	1	15 6 0
11 11 0	23 10 0	2	47 8 0	1	23 10 0
14 8 9	29 5 6	3	88 4 6	1	29 5 6
16 3 0	32 6 0	4	130 0 0	1	32 6 0
17 4 9	34 9 6	5	173 11 5	1	34 9 6
18 1 9	36 3 6	6	217 9 0	1	36 3 6
18 5 0	36 10 0	7	257 10 0	1	36 10 0
18 3 0	36 6 0	8	292 0 0	1	36 6 0
17 10 9	35 9 6	9	322 1 6	1	35 9 6
17 2 6	34 5 0	10	340 10 0	1	34 5 0
15 10 3	31 8 6	11	348 9 6	1	31 8 6
13 6 0	27 0 0	12	324 0 0	1	27 0 0
9 7 6	19 3 0	13	250 3 0	1	19 3 0
5 4 9	10 9 6	$\left((3\times15)-4\right)\times\frac{1}{6}$	73 8 11	$0\frac{1}{2}$	5 4 9
205 7 6	411 3 0		2883 11 0		402 6 9

Hence the distance of the centre of gravity of double the plane 8 *d l* G from its first ordinate 8 *d*, is

$= \frac{2883\ 11\ 0}{402\ 6\ 9} \times 10\ 0\ 4 = \frac{2883.916}{402.56} \times 10.03 =$ - - - 71.85

Distance of this ordinate from the aft side of the post - - - 13.5

Distance of the centre of gravity of the plane from the aft side of the post - - 85.35

Distance of the centre of gravity of double the trapezium AR *d* 8 from its ordinate AR - 7.89
Distance of this ordinate from the aft side of the post - - - 0.58

Distance of the centre of gravity of the trapezium from the aft side of the post - - 8.47

Distance of the centre of gravity of the foremost trapezium from its ordinate G *l* - - 4.83
Distance of this ordinate from aft side of the post - - 153.78

Distance of the centre of gravity of the trapezium from the aft side of the post - - 158.61

Distance of the centre of gravity of the section of the post from its aft side - - 0.29
Distance of the centre of gravity of the section of the stem from the aft side of the post - - 169.76

Centre of Gravity.

The areas of these several planes being calculated, will be as follow:

4037.6768	for that of double the plane 8 *d l* G, and its momentum 4037.6768 × 85.35 =	344615.7149
51.12	the area of double the trapezium AR *d* 8, and its momentum 51.12 × 8.47 =	432.9804
79.16	the area of the foremost trapezium, and its momentum 79.16 × 158.61 =	12555.5676
0.77	the area of the section of the post, and its momentum 0.77 × 0.29 =	0.2233
0.77	the area of the section of the stem, and its momentum 0.77 × 169.76 =	130.7152
4169.4968	Sum	357735.2074

Then $\frac{357735.2074}{4169.4968} = 85.80$, the distance of the fourth horizontal section from the aft side of the stern-post.

V. *Determination of the Centre of Gravity of the fifth Horizontal Section.*

Distance of the centre of gravity of double the plane 8 *c k* G from its first ordinate 8 *c*.

Ordinates. Feet.	In.	L.	Double Ord. Feet.	In.	L.	1. Factors.	1. Products. Feet.	In.	L.	2. Fact.	2. Products. Feet.	In.	L.
1	9	0	3	6	0	$0\frac{1}{6}$	0	7	0	$0\frac{1}{2}$	1	9	0
4	6	0	9	0	0	1	9	0	0	1	9	0	0
8	3	0	16	6	0	2	33	0	0	1	16	6	0
11	8	3	23	4	6	3	70	1	6	1	23	4	6
13	10	3	27	8	6	4	110	10	0	1	27	8	6
15	3	0	30	6	0	5	152	6	0	1	30	6	0
16	0	3	32	0	6	6	192	3	0	1	32	0	6
16	5	0	32	10	0	7	229	10	0	1	32	10	0
16	3	0	32	6	0	8	260	0	0	1	32	6	0
15	9	0	31	6	0	9	283	6	0	1	31	6	0
14	10	0	29	8	0	10	296	8	0	1	29	8	0
12	10	3	25	8	6	11	282	9	6	1	25	8	6
9	8	9	19	5	6	12	233	6	0	1	19	5	6
6	1	6	12	3	0	13	159	3	0	1	12	3	0
3	3	0	6	6	0	$\left((3\times15)-4\right)\times\frac{1}{6}$	44	5	0	$0\frac{1}{2}$	3	3	0
166	6	3	333	0	7		2358	3	0		328	0	6

Hence the distance of the centre of gravity of double the plane 8 *c k* G from its first ordinate is $\frac{2358\ 3\ 0}{328\ 0\ 6}$

× 10 0 4 = $\frac{2358.25}{328.04}$ × 10.03 =		72.10
Distance of this ordinate from the aft side of the post		13.50
Distance of the centre of gravity of the plane from the aft side of the post		85.60
Distance of the centre of gravity of double the trapezium AR *c* 8 from its ordinate AR		7.42
Distance of this ordinate from the aft side of post		0.58
Distance of centre of gravity of trapezium from aft side of the post		8.00
Distance of the centre of gravity of the foremost trapezium from its ordinate G *k*		4.22
Distance of this ordinate from the aft side of post		153.78
Distance of the centre of gravity of the foremost trapezium from the aft side of the post		158.00
Distance of the centre of gravity of the section of the post from the aft side of post		0.29
Distance of the centre of gravity of the section of the stem from the aft side of post		169.76

The

Centre of Gravity.

The areas of these several planes being calculated, will be as follow.

Centre of Gravity.

3290.2412	for the area of double the plane 8 *c k* G, and its momentum 3290.2412 × 85.6 =	281644.6467
31.21	the area of double the trapezium AR *c* 8, and its momentum 31.21 × 8 =	249.68
42.43	the area of the foremost trapezium, and its momentum 42.43 × 158 =	6703.94
0.77	the area of the section of the post, and its momentum 0.77 × 0.29 =	0.2233
0.77	the area of the section of the stem, and its momentum 0.77 × 169.76 =	130.7152
3365.4212	Sum	288729.2052

Now $\frac{288729.2052}{3365.4212} = 85.79$, the distance of the centre of gravity of the whole section from the aft side of the stern.

VI. *Determination of the Centre of Gravity of the sixth Horizontal Section.*

Distance of the centre of gravity of double the plane 8 *b i* G from its first ordinate 8 *b*.

Ordinates.			Double Ord.			1. Factors.	1. Products.			2. Fact.	2. Products.		
Feet.	In.	L.	Feet.	In.	L.		Feet	In.	L.		Feet.	In.	L.
1	0	0	2	0	0	$0\frac{1}{6}$	0	4	0	$0\frac{1}{2}$	1	0	0
2	5	0	4	10	0	1	4	10	0	1	4	10	0
4	5	0	8	10	0	2	17	8	0	1	8	10	0
7	3	6	14	7	0	3	43	9	0	1	14	7	0
10	1	9	20	3	6	4	81	2	0	1	20	3	6
12	1	3	24	2	6	5	121	0	6	1	24	2	6
13	3	0	26	6	0	6	159	0	0	1	26	6	0
13	9	9	27	7	6	7	193	4	6	1	27	7	6
13	7	0	27	2	0	8	217	4	0	1	27	2	0
12	8	0	25	4	0	9	228	0	0	1	25	4	0
10	6	6	21	1	0	10	210	10	0	1	21	1	0
7	1	0	14	2	0	11	155	10	0	1	14	2	0
4	7	3	9	2	6	12	110	6	0	1	9	2	6
2	10	6	5	9	0	13	74	9	0	1	5	9	0
1	6	9	3	1	6	$\times\left((3\times 15)-4\right)\times\frac{1}{6}$	21	4	3	$0\frac{1}{2}$	1	6	9
117	4	3	234	8	6		1639	9	3		232	1	9

Hence the distance of the centre of gravity of double the plane 8 *b v* G from its first ordinate 8 *b* is

$\frac{1639\ 9\ 3}{232\ 1\ 3} \times 10\ 0\ 4 = \frac{1639.77}{232.14} \times 10.03 =$ - - - - 70.84

Distance of this ordinate from aft side of post - - - - 13.50

Hence the distance of the centre of gravity of the plane from the aft side of the post is - - 84.34

Distance of the centre of gravity of the trapezium AR *b* 8 from its ordinate AR - 6.88

Distance of this ordinate from the aft side of the post - - - - 0.58

Distance of the centre of gravity of the trapezium from the aft side of the post - - 7.46

Distance of the centre of gravity of the foremost trapezium from the ordinate G *i* - - 2.92

Distance of this ordinate from the aft side of post - - - 153.78

Distance of the centre of gravity of this trapezium from the aft side of the post - 156.70

Distance of the centre of gravity of the section of the post from its aft side - 0.29

Distance of the centre of gravity of the section of the stem from the aft side of the post - 169.76

The areas of these planes will be found to be as follow:

2328.3642	for that of double the plane 8 *b i* G, and its momentum 2328 3642 + 84.34 =	196374.2366
21.52	for the area of double the trapezium AR *b* 8, and its momentum 21.52 × 7.46 =	160.5392
15.04	the area of the foremost trapezium, and its momentum 15.04 × 156.7 =	2356.7680
0.77	the area of the section of the post, and its momentum 0.77 × 0.29 =	0.2233
0.77	the area of the section of the stem, and its momentum 0.77 × 169.76 =	130.7152
2366.4642	Sum	199022.4823

Now

Centre of Gravity.

Now $\frac{199022.4823}{2366.4642} = 84.1$, the distance of the centre of gravity of the whole from the aft side of the post.

Centre of Gravity.

VII. *Determination of the Centre of Gravity of the seventh Horizontal Section.*

Distance of the centre of gravity of double the plane 8 *a h* G from its first ordinate 8 *a*.

Ordinates. Feet.	In.	Lin.	Double Ord. Feet.	In.	L.	1. Factors.	1. Products. Feet.	In.	Lin.	2. Fact.	2 Products. Feet.	In.	Lin.
0	8	0	1	4	0	$0\frac{1}{8}$	0	2	8	$0\frac{1}{2}$	0	8	0
1	1	6	2	3	0	1	2	3	0	1	2	3	0
1	7	6	3	3	0	2	6	6	0	1	3	3	0
1	10	9	3	9	6	3	11	4	6	1	3	9	6
2	1	3	4	2	6	4	16	10	0	1	4	2	6
2	1	0	4	2	0	5	20	10	0	1	4	2	0
1	10	9	2	9	6	6	22	9	0	1	3	9	6
1	8	0	3	4	0	7	23	4	0	1	3	4	0
1	1	0	2	2	0	8	17	4	0	1	2	2	0
0	9	0	1	6	0	9	13	6	0	1	1	6	0
0	8	0	1	4	0	10	13	4	0	1	1	4	0
0	8	0	1	4	0	11	14	8	0	1	1	4	0
0	8	0	1	4	0	12	16	0	0	1	1	4	0
0	8	0	1	4	0	13	17	4	0	1	1	4	0
0	8	0	1	4	0	$\left((3\times15)-4\right)\times\frac{1}{8}$	9	1	4	$0\frac{1}{2}$	0	8	0
18	2	9	36	5	6		205	4	6		35	1	6

Hence the distance of the centre of gravity of double this plane from its first ordinate is $\frac{205\ 4\ 6}{35\ 1\ 6} \times 10\ 0\ 4$

$= \frac{205.37}{35.12} \times 10.83 =$ - - - 58.65

The distance of this ordinate from aft side of post = - - - - - 13.50

Hence the distance of the centre of gravity of this plane from the aft side of the post is 72.15

Distance of the centre of gravity of double the rectangle AR *a* 8 from its ordinate AR 6.45

Distance of this ordinate from the aft side of the post - - - - 0.58

Distance of the centre of gravity of this rectangle from the aft side of the post 7.03

Distance of the centre of gravity of the foremost rectangle from its ordinate 7′ 7 *e* 7′ 1.25

Distance of this ordinate from the aft side of the post - - - 153.78

Distance of the centre of gravity of this rectangle from the aft side of the post 155.03

Distance of the centre of gravity of the section of the post from its aft side 0.29

Distance of the centre of gravity of the section of the stem from the aft side of the post - - - - 169.76

Now, the areas of these several plans being calculated will be as follows.

352.2536, the area of double the plan 8*a*h G, and its momentum $352.2536 \times 72.15 =$ 25415 9 2

17.1570, the area of double the rectangle AR *a* 8, and its momentum $17.1570 \times 7.03 =$ 120.6137

3.3250, the area of the foremost rectangle, and its momentum $3.3250 \times 155.03 =$ 515.4747

0.77, the area of the section of the post, and its momentum $0.77 \times 0.29 =$ 0.2233

077, the area of the section of the stem and its momentum $0.77 \times 166.76 =$ 130.7152

374.2756 Sum 26182.1242

Then $\frac{26182.1242}{374.2756} = 69.95$, the distance of the centre of gravity of the whole section from the aft side of the post.

VIII. *Determination of the Centre of Gravity of the eighth Plane.*

This plane is equal in length to the seventh horizontal plane, and its breadth is equal to that of the keel. The distance between the seventh and eighth planes is three feet, but which is here taken equal to 2 feet 11½ inches.

Centre of Gravity.		
	Diſtance between the aft ſide of the poſt and the firſt ordinate - - -	13.5
	Fourteen intervals between the fifteen ordinates, each interval being 10.03 feet	140.42
	Diſtance of the laſt ordinate from the fore foot	2.2
	Hence the length of the eighth plane is	156.12
	Which multiplied by the breadth	1.33
	The product is the area of this plane	208.
	The diſtance of its centre of gravity from the aft ſide of the poſt, being equal to half its length, is - - -	78.06

The centres of gravity of theſe eight planes being found, the diſtance of the centre of gravity of the bottom of the ſhip from the aft ſide of the poſt, and alſo its altitude, may from thence be eaſily determined.

From the principles already explained, the diſtance of the centre of gravity of the bottom from the aft ſide of the poſt, is equal to the ſum of the momentums of an infinite number of horizontal planes, divided by the ſum of theſe planes, or, which is the ſame, by the ſolidity of the bottom. As, however, we have no more than eight planes, we muſt therefore conceive their momentums as the ordinates of a curve, whoſe diſtances may be the ſame as that of the horizontal planes. Now the ſum of theſe ordinates minus half the ſum of the extreme ordinates being multiplied by their diſtance, gives the ſurface of the curve; of which any ordinate whatever repreſents the momentum of the horizontal plane at the ſame altitude as theſe ordinates; and the whole ſurface will repreſent the ſum of the momentums of all the horizontal planes.

Hor. Planes.	Fact.	Products.	Momentums.	Fact.	Products.
5974.16	0½	2987.08	503037.73	0½	251518.86
5592.27	1	5592.27	473560.21	1	473560.21
4939.27	1	4939.27	422084.77	1	422084.77
4169.50	1	4169.50	357735.21	1	357735.21
3365.42	1	3365.42	288729.20	1	288729.20
2366.46	1	2366.46	199022.48	1	199022.48
374.27	1	374.27	21682.12	1	21682.12
208.00	0½	104.00	16236.48	0½	8118.24
		23898.27			2022451.09

Now $\frac{2022451.09}{23898.27}=84.63$, the diſtance of the centre of gravity of the bottom of the ſhip from the aft ſide of the poſt.

The height of the centre of gravity of the bottom above the lower edge of the keel may be determined by the ſame principles. Thus,

To one-ſixth of the lowermoſt horizontal ſection add the product of one-ſixth of the uppermoſt ſection by three times the number of ſections minus four the ſecond ſection in aſcending, twice the third, three times the fourth, &c.; and to half the ſum of the extreme planes add all the intermediate ones. Now the firſt of theſe ſums, multiplied by the diſtance between the planes or ſections, and divided by the ſecond ſum, gives the altitude of the centre of gravity of the bottom of the ſhip above the lower edge of the keel as required.

Hor. Planes.	1ſt Fact.	1ſt Products.	2d Fact.	2d Products.	Centre of Gravity.
208.00	0⅙	34.67	0½	104.00	
374.27	1	374.27	1	374.27	
2366.46	2	4732.92	1	2366.46	
3365.42	3	10096.26	1	3365.42	
4169.50	4	16678.00	1	4169.50	
4939.27	5	24696.35	1	4939.27	
5592.27	6	33553.62	1	5592.27	
5974.16	(3×8)—4	×⅙ 19913.87	0½	2987.08	
		110079.96		23898.27	

Now $\frac{110079.96}{23898.27}\times 2.95=13.588$, the height of the centre of gravity of the bottom of the ſhip above the lower edge of the keel.

We have now found the diſtance of the centre of gravity of the bottom of the ſhip from the aft ſide of the poſt, and its altitude above the lower edge of the keel. Hence the ſhip being ſuppoſed in an upright poſition, this centre of gravity will neceſſarily be in the vertical longitudinal ſection which divides the ſhip into two equal and ſimilar parts; the poſition of this centre is therefore determined.

70 Determination of the height of the metacenter above the centre of gravity.

It now remains to find the height of the metacenter above the centre of gravity; the expreſſion for this altitude, as found in Chap. III. is $\frac{\frac{2}{3}\int y^3 x}{V}$; which we ſhall now apply to determine the metacenter of the ſhip of 74 guns, whoſe centre of gravity we have already found.

Ord. of the Plane of Floatation.				*Cub. of Ordinates.*
Feet.	Inches.		Feet and dec. of Foot.	
14	9	0	14.7	3209.046
17	1	6	17.1	5000.211
18	9	0	18.7	6591.797
19	10	0	19.8	7762.392
20	7	6	20.6	8741.816
21	1	9	21.2	9595.703
21	6	3	21.5	9938.375
21	7	9	21.7	10289.109
21	7	9	21.7	10289.109
21	7	6	21.7	10289.109
21	4	0	21.3	9663.597
20	10	6	20.9	9129.329
19	9	0	19.7	7703.734
17	4	6	17.4	5268.024
13	1	3	13.1	2248.091
291	1	3	291.1	115719.442
			Ordinate at 10.03 feet abaft the ordinate $8g$,=4, of which the cube is 64, and $64\times\frac{1}{2}$ - -	32.
			Ordinate at 10.03 feet afore the ordinate G o=6, cube of which is 216 and $216\times\frac{1}{2}$ - -	108.
			Sum - - -	115859.442
			Diſtance between the ordinates -	10.03
			Product - -	1162070.20326

Product

Centre of Gravity.

Product - -		1162070.20326
Half the cube of the aftermoſt ordinate -	32.	
Half the cube of the thickneſs of the ſtem -	0.14	
Sum - -	32.14	
Diſtance between the ordinates	3.0	
Product - - -		96.42
Half the cube of the foremoſt ordinate -	108.	
Half the cube of the thickneſs of the ſtem -	.14	
Sum - -	108.14	
Diſtance between the ordinates	5.5	
Product - - -		594.77
$\int y^3 x$ - -		1162761.39326
$2\int y^3 x$ - -		2325522.78652
$\frac{2}{3}\int y^3 x$ - -		775174.26217

The ſolidity of the bottom is 2527¾ tons = 70018.67 cubic feet: hence $\frac{\frac{2}{3}\int y^3 x}{V} = \frac{77517.26}{70018.67} = 11.07$ feet, the altitude of the metacenter above the centre of gravity of the bottom of the ſhip.

APPENDIX.

WHEN a ſhip is built, ſhe muſt be fitted with maſts, yards, ſails, ropes, and blocks, or, in other words, ſhe muſt be *rigged* before ſhe can go to ſea. To complete this article, it may therefore be thought neceſſary to treat of the art of rigging veſſels; but we have elſewhere (ſee *MAST-Rigging*, ROPE-MAKING, and SAIL) ſhown how the ſeveral parts of a ſhip's rigging are made; and the art of putting them properly together, ſo as to make the ſhip beſt anſwer the purpoſe for which ſhe is intended, depends upon a juſt knowledge of the impulſe and reſiſtance of fluids, and of the theory and practice of ſeamanſhip. (See *RESISTANCE of Fluids* and SEAMANSHIP). Nothing, therefore, of the ſubject is left to us here, except we were to ſtate in few words the progreſſive method of rigging ſhips; but there is no one undeviating mode which is purſued, as the nature of the operation is ſuch that all the parts of it may be advancing at the ſame time. We ſhall therefore take our leave of *ſhips* and *ſhip-building* with a few general obſervations on *ſail-making*, and refer our readers for farther information to the very elegant work on *the Elements and Practice of Rigging and Seamanſhip* in two volumes quarto.

Sails are made of canvas, of different textures, and are extended on or between the maſts, to receive the wind that forces the veſſel through the water. They are quadrilateral or triangular, as has been elſewhere deſcribed, and are cut out of the canvas cloth by cloth. The width is governed by the length of the yard, gaff, boom, or ſtay; the depth by the height of the maſt.

Appendix.

In the valuable work to which we have juſt referred, the following directions are given for cutting ſails. "The width and depth being given, find the number of cloths the width requires, allowing for ſeams, tabling on the leeches, and ſlack cloth; and, in the depth, allow for tabling on the head and foot. For ſails cut ſquare on the head and foot, with gores only on the leeches, as ſome topſails, &c. the cloths on the head, between the leeches, are cut ſquare to the depth; and the gores on the leeches are found by dividing the depth of the ſail by the number of cloths gored, which gives the length of each gore. The gore is ſet down from a ſquare with the oppoſite ſelvage; and the canvas being cut diagonally, the longeſt gored ſide of one cloth makes the ſhorteſt ſide of the next; conſequently, the firſt gore being known, the reſt are cut by it. In the leeches of topſails cut hollow, the upper gores are longer than the lower ones; and in ſails cut with a roach leech, the lower gores are longer than the upper ones. This muſt be regulated by judgment, and care taken that the whole of the gores do not exceed the depth of the leech. Or, by drawing on paper the gored ſide of the ſail, and delineating the breadth of every cloth by a convenient ſcale of equal parts of an inch to a foot, the length of every gore may be found with preciſion. Sails, gored with a ſweep on the head or the foot, or on both, have the depth of their gores marked on the ſelvage, from the ſquare of the given depth on each cloth, and are cut as above; the longeſt ſelvage of one ſerving to meaſure the ſhorteſt ſelvage of the next, beginning with the firſt gored cloth next the middle in ſome ſails, and the firſt cloth next to the maſt leech in others. For thoſe gores that are irregular no ſtrict rule can be given; they can only be determined by the judgement of the ſail-maker, or by a drawing.

"In the royal navy, mizen topſails are cut with three quarters of a yard hollow in the foot; but, in the merchant ſervice, top and topgallant ſails are cut with more or leſs hollow in the foot. Flying jibs are cut with a roach curve on the ſtay, and a three-inch gore in each cloth, ſhortening from the tack to the clue. Lower ſtudding-ſails are cut with ſquare leeches, and topmaſt and topgallant-maſt ſtudding ſails with goring leeches. *Elements and Practice of Rigging and Seamanſhip*, vol. i. p. 91.

"The length of reef and middle bands is governed by the width of the ſail at their reſpective places; the leech-linings, buntline-cloths, top linings, maſt-cloths, and corner-pieces, are cut agreeably to the depth of the ſail; each cloth and every article ſhould be properly marked with charcoal, to prevent confuſion or miſtake. Sails that have bonnets are cut out the whole depth of the ſail and bonnet included, allowing enough for the tablings on the foot of the ſail and head and foot of the bonnet. The bonnet is cut off after the ſail is ſewed together. If a drabler is required, it is allowed for in the cutting out the ſame as the bonnet.

When the cloth is thus properly cut, the different pieces are to be joined together in the form of a ſail; and for doing this properly we have the following directions in the work already quoted. "Sails have a double flat ſeam, and ſhould be ſewed with the beſt Engliſh made twine of three threads, ſpun 360 fathoms to the pound, and have from one hundred and eight to one hundred and ſixteen ſtitches in every yard in length. The twine for large ſails, in the royal navy, is waxed

Appendix. by hand, with genuine bees wax, mixed with one ſixth part of clear turpentine; and, for ſmall ſails, in a mixture made with bees wax, 4 lb. hogs lard 5 lb. and clear turpentine 1 lb. In the merchant ſervice, the twine is dipped in tar (L), ſoftened with a proper proportion of oil.

" It is the erroneous practice of ſome ſailmakers not to ſew the ſeams any farther than where the edge is creaſed down for the tabling; but all ſails ſhould be ſewed quite home to the end, and, when finiſhed, ſhould be well rubbed down with a rubber. In the merchant ſervice ſeams are ſometimes made broader at the foot than at the head, being ſtronger. Broad ſeams are not allowed to be made on courſes, in the royal navy, but goring leeches are adopted in lieu of them. Boom-mainſails and the ſails of ſloops generally have the ſeams broader at the foot than at the head. The ſeams of courſes and topſails are ſtuck or ſtitched up, in the middle of the ſeams, along the whole length, with double ſeaming twine; and have from 68 to 72 ſtitches in a yard. In the merchant ſervice it is common to ſtick the ſeams with two rows of ſtitches, when the ſail is half worn, as they will then laſt till the ſail is worn out.

" The breadth of the ſeams of courſes, topſails, and other ſails, in the royal navy, to be as follow, viz. courſes and topſails, for 50 gun ſhips and upwards, one inch and a half, and for 44 gun ſhips and under, one inch and a quarter, at head and foot; all other ſails, one inch at head and foot.

" The tablings of all ſails are to be of a proportionable breadth to the ſize of the ſail, and ſewed at the edge, with 68 to 72 ſtitches in a yard. Thoſe for the heads of main and fore courſes to be four to ſix inches wide; for ſprit courſes and mizens, drivers, and other boom ſails, 3 to 4 inches wide; for topſails, 3 inches to 4 inches and a half; topgallant and ſprit topſails, 3 inches; royal ſails, 2 inches and a half; jib and other ſtayſails, 3 inches to 4 inches and a half, on the ſtay or hoiſt; and for ſtudding ſails, 3 inches to 4 inches on the head. Tablings on the foot and leeches of main and fore courſes to be 3 inches to 5 inches broad; ſprit courſe and topſails, 3 inches; topgallant and ſprit topſails, 2 inches and a half; royals, 2 inches; fore leeches of mizen, driver, and other boomſails, 3 inches and a half to 4 inches; after leech, 3 inches; and on the foot 2 or 3 inches. Tablings on the after leech of jibs and other ſtayſails to be from 2 to 3 inches broad; and, on the foot, 2 to 2 inches and a half: on ſtudding ſail leeches one inch and a half to two inches and a half; and on the foot, from one to two inches.

" Main and fore courſes are lined on the leeches, from clue to earing, with one cloth ſeamed on and ſtuck or ſtitched in the middle, and have a middle band half way between the lower reef band and the foot, alſo four buntline cloths, at equal diſtances between the leeches, the upper ends of which are carried under the middle band, that the lower ſide of the band may be tabled upon or ſewed over the end of the buntline pieces. They have likewiſe two reef bands; each in breadth one third of the breadth of the canvas; the upper one is one ſixth of the depth of the ſail from the head, and the lower band is at the ſame diſtance from the upper one; the ends go four inches under the leech linings, which are ſeamed over the reef bands. All linings are ſeamed on, and are ſtuck with 68 to 72 ſtitches in a yard. Appendix.

" Main, fore, and mizen, topſails have leech linings, maſt and top linings, buntline cloths, middle bands and reef bands. The leech linings are made of one breadth of cloth, ſo cut and ſewed as to be half a cloth broad at the head, and a cloth and a half broad at the foot; the piece cut out being half the breadth of the cloth at one end, and tapering to a point at the other. The middle bands are put on half way between the lower reef and foot, the buntline cloths join the top-linings, and the buntline cloths and top-linings are carried up to the lower ſide of the middle band, which is tabled on them. The maſt lining is of two cloths, and extends from the foot of the ſail to the lower reef, to receive the beat or chafe of the maſt. The middle band is made of one breadth of canvas, of the ſame number as the top lining. It is firſt folded and rubbed down, to make a creaſe at one third of the breadth; then tabled on the ſelvage, and ſtuck along the creaſe; then turned down, and tabled and ſtuck through both the double and ſingle parts, with 68 to 72 ſtitches in a yard. It is the opinion of many, that middle bands ſhould not be put on until the ſail is half worn.

" Main and fore topſails have three and ſometimes four reef bands from leech to leech, over the leech linings; the upper one is one eighth of the depth of the ſail from the head, and they are the ſame diſtance aſunder in the royal navy, but more in the merchant ſervice. The reef bands are each of half a breadth of canvas put on double; the firſt ſide is ſtuck twice, and the laſt turned over, ſo that the reef holes may be worked upon the double part of the band, which is alſo ſtuck with 68 to 72 ſtitches in a yard.

" The top lining of topſails is of canvas, N° 6 or 7. The other linings of this, and all the linings of other ſails, ſhould be of the ſame quality as the ſails to which they belong.

" Top-linings and maſt cloths are put on the aft ſide, and all other linings on the fore ſide, of ſails. Mizens are lined with one breadth of cloth from the clue five yards up the leech, and have a reef band ſewed on, in the ſame manner as on other ſails, at one fifth the depth of the ſail from the foot; they have alſo a nock-piece and a peek-piece, one cut out of the other, ſo that each contains one yard. Mizen topſails of 50 gun ſhips and upwards have three reefs, the upper one is one eighth of the depth of the ſail from the head, and the reefs are at the ſame diſtance aſunder. Mizen topſails of ſhips of 44 guns and under have two reefs one ſeventh part of the depth of the ſail aſunder, the upper one being at the ſame diſtance from the head. Main and main top ſtudding ſails have each one reef, at one eighth of the depth of the ſail from the head. Reef bands ſhould not be put on until the ſail is ſewed up, a contrary practice being very erroneous. Lower ſtayſails,

(L) The dipping of the twine in tar, we are perſuaded, is a very bad practice, for the reaſon aſſigned in ROPE-MAKING. See that article, N° 32.

Fig. 1.

PIECES of the HULL.

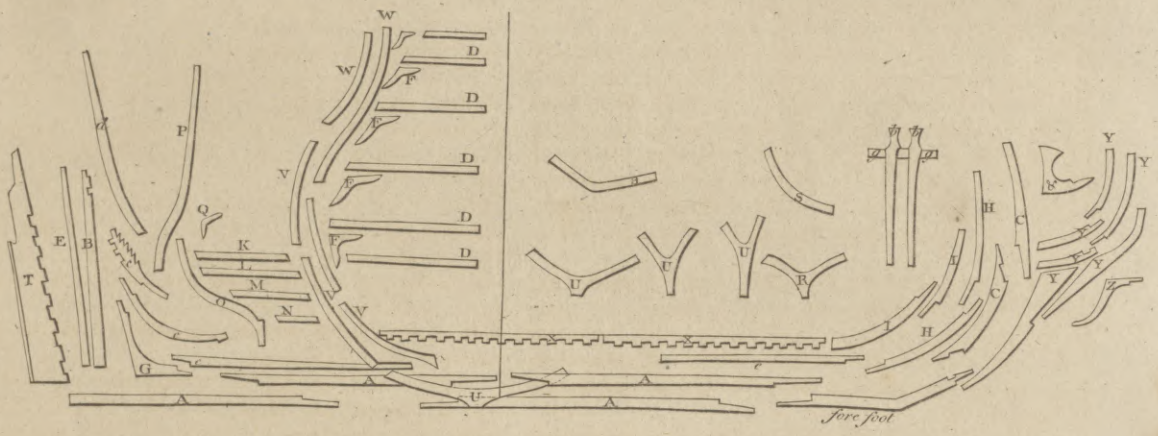
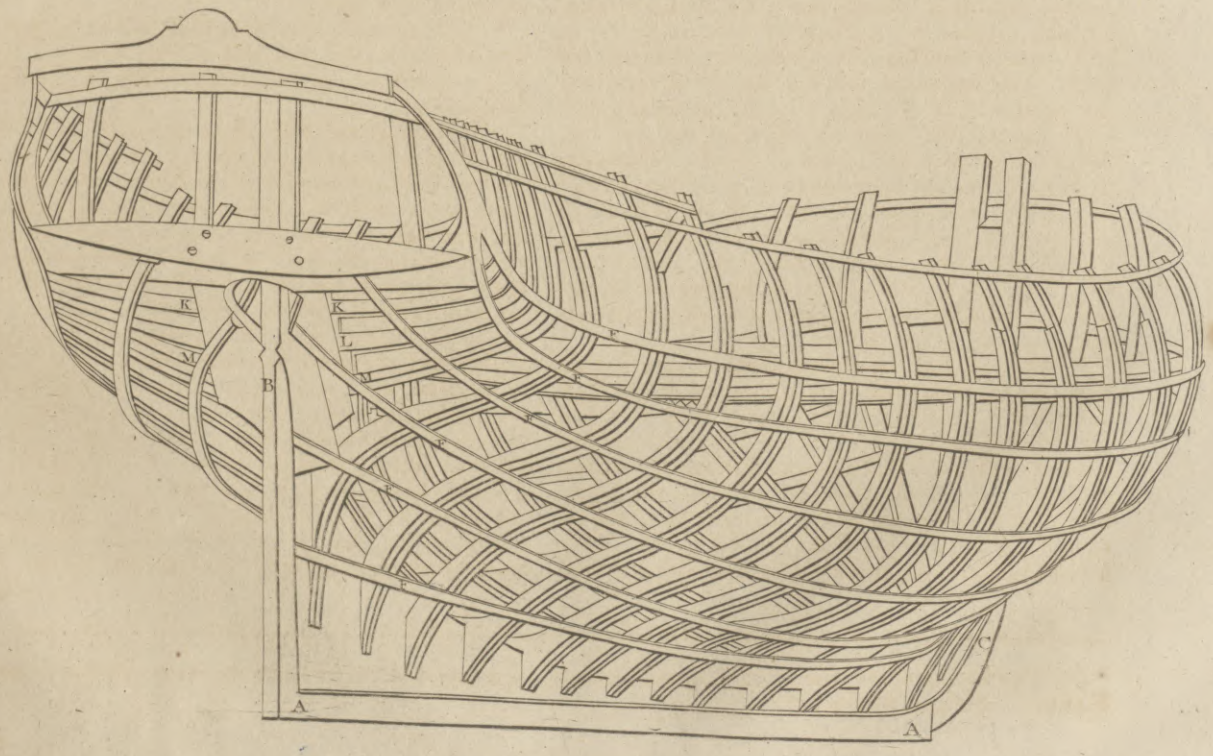


Fig. 2.

FRAMES of a SHIP.



E. Mitchell sculp.

Fig. 3.

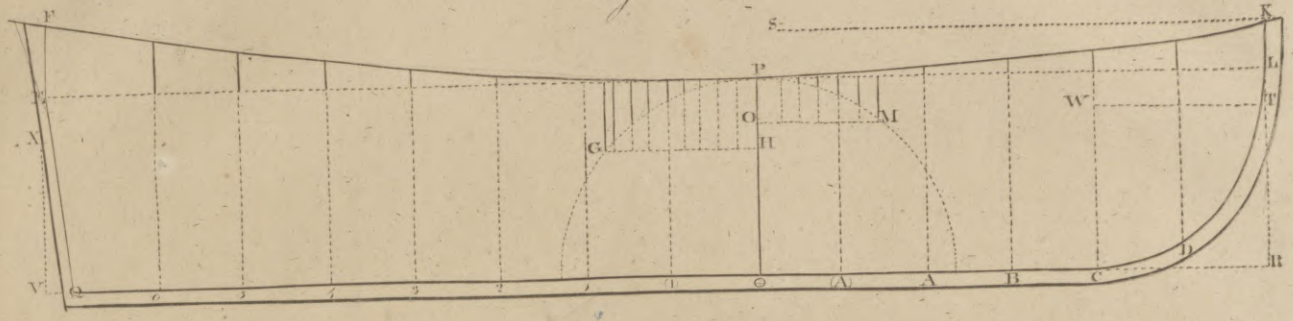


Fig. 4.

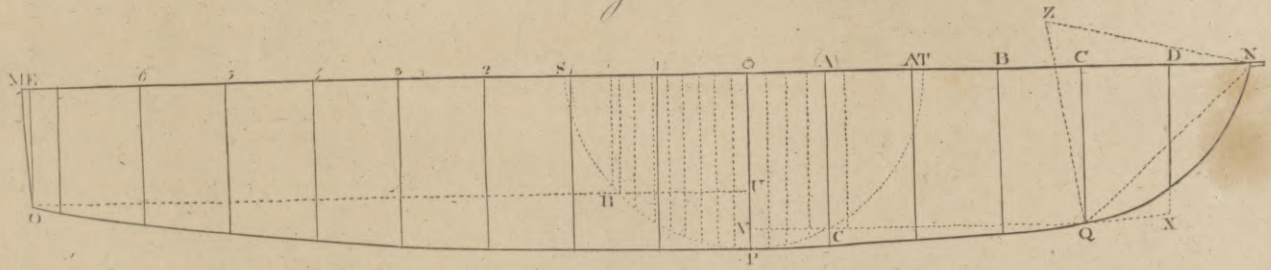
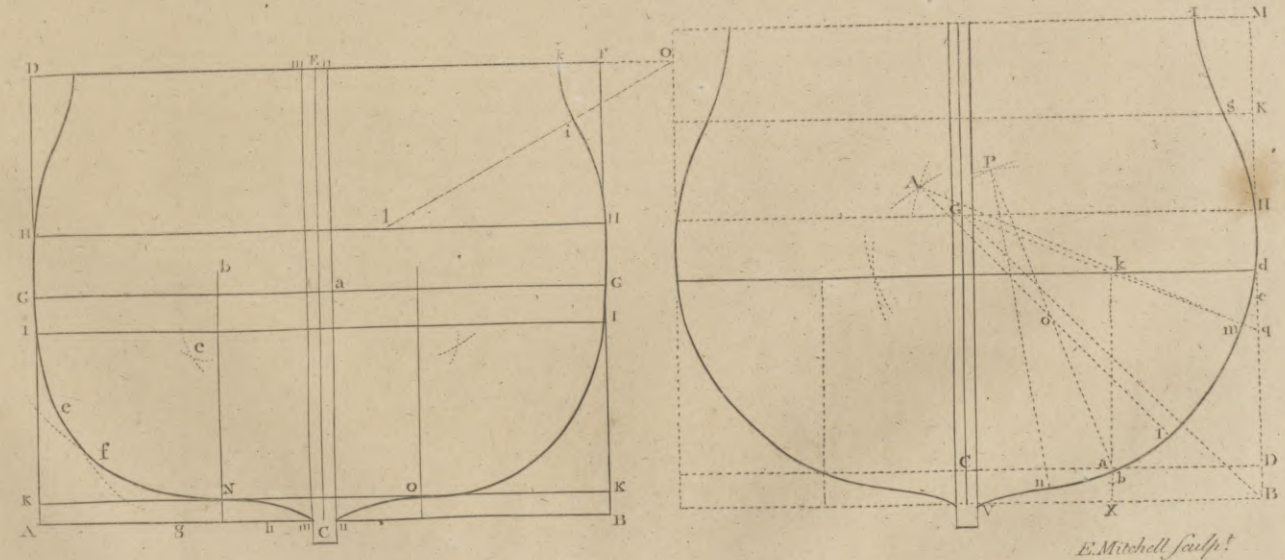


Fig. 6.

Fig. 5.



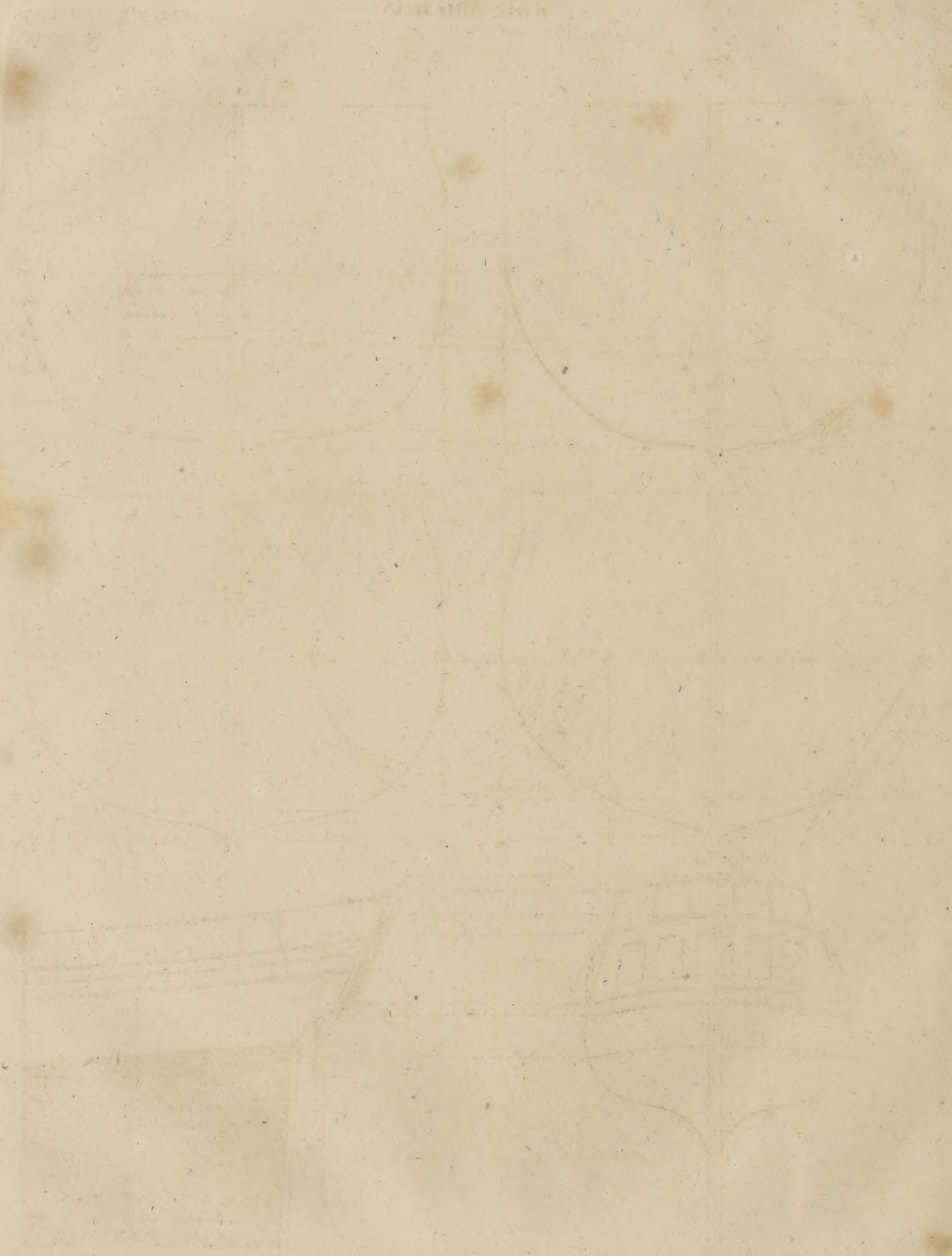


Fig. 7.

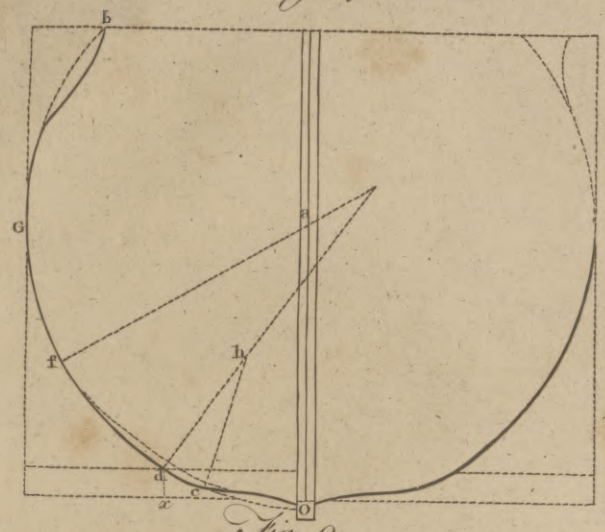


Fig. 8.

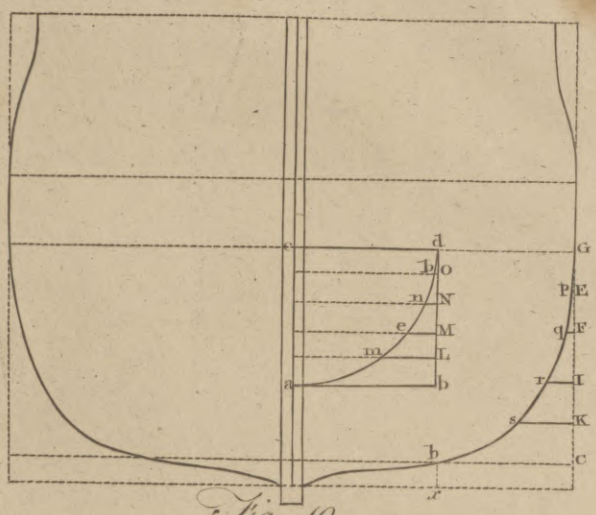


Fig. 9.

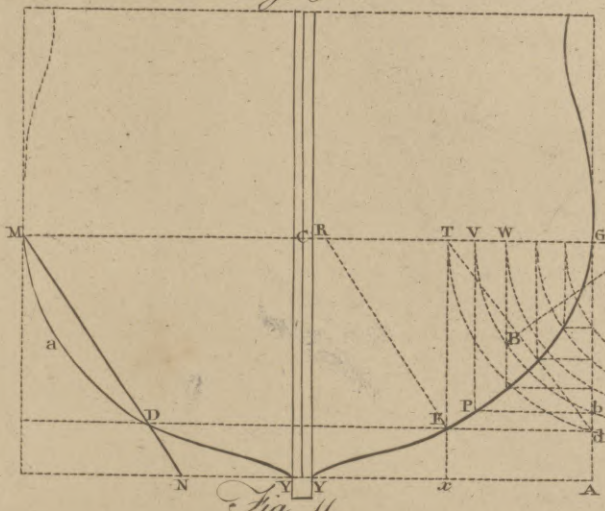


Fig. 10.

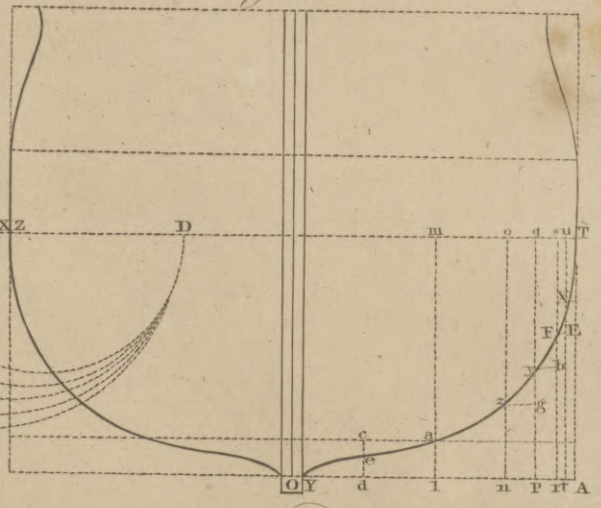
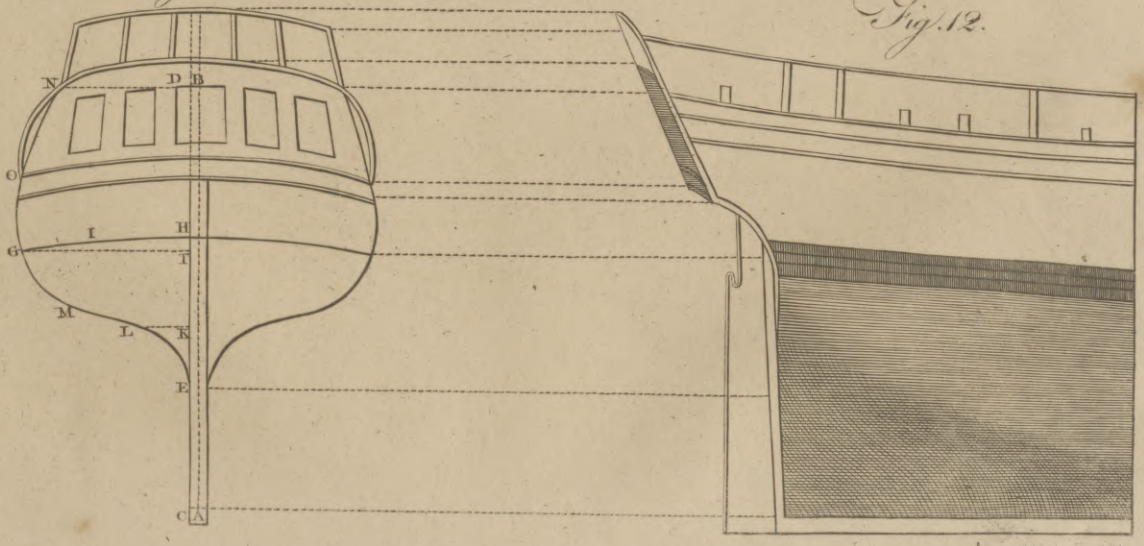
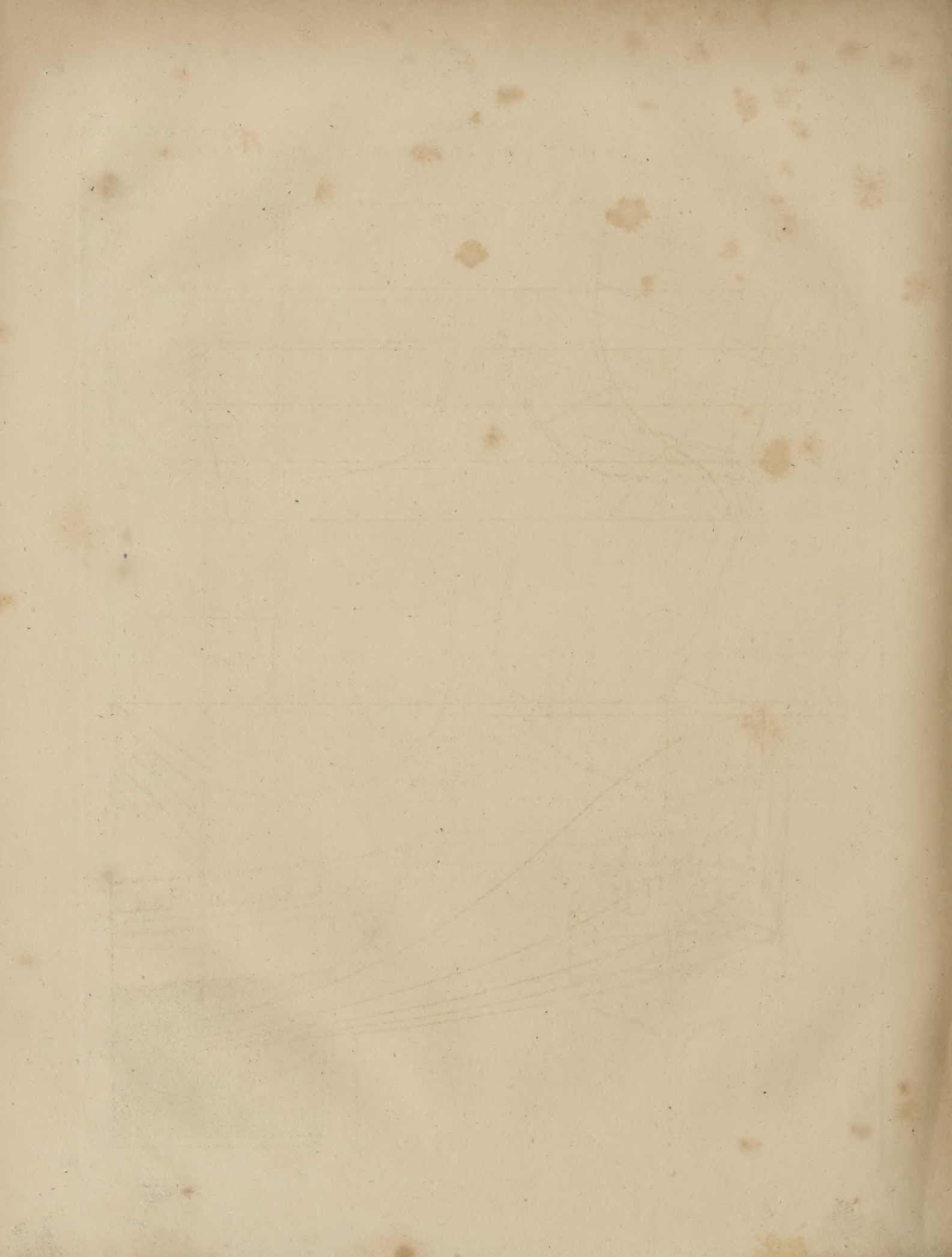


Fig. 11.

Fig. 12.



W. Train Sculp.



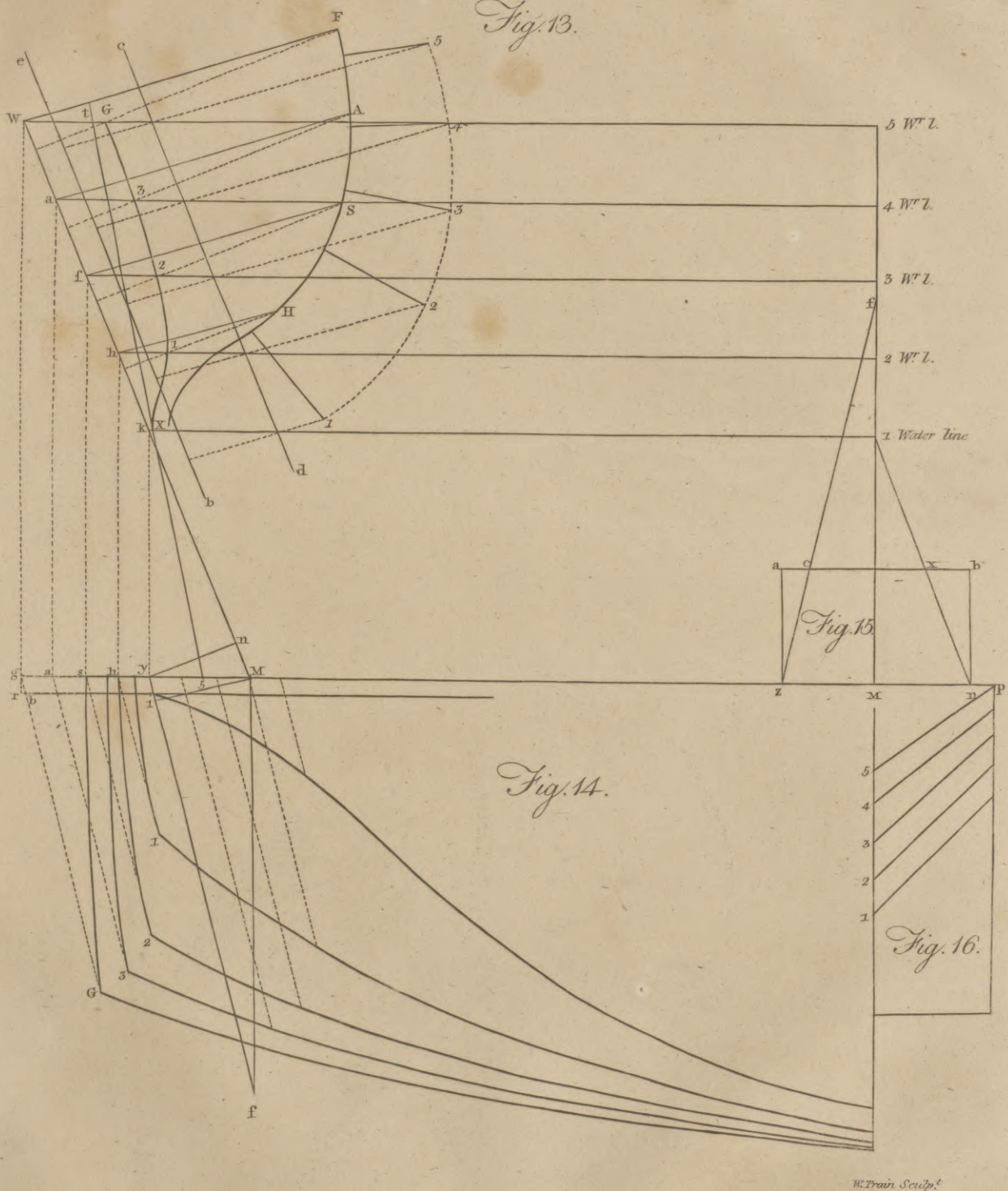

Fig. 13.
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S
3
4 Wr l.
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3 Wr l.
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f
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2 Wr l.
k
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1 Water line
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a
c
X
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Fig. 15.
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Fig. 14.
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Fig. 16.
W. Train Sculp.t



Fig. 17.

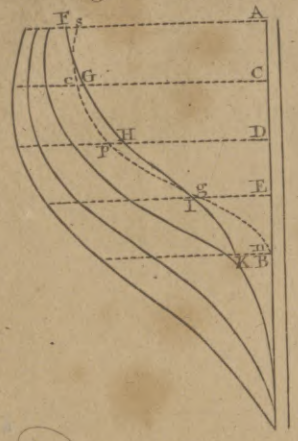


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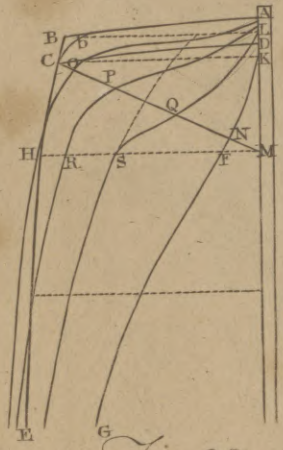


Fig. 19.

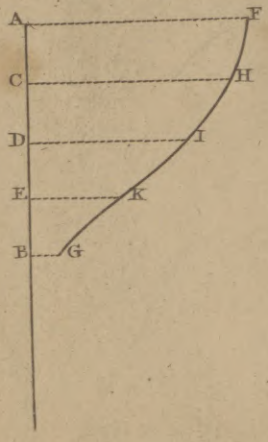


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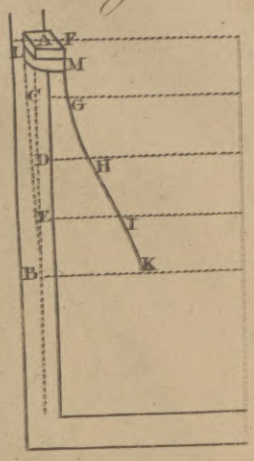


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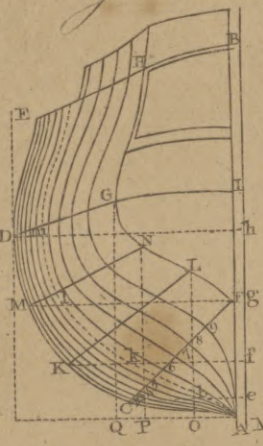


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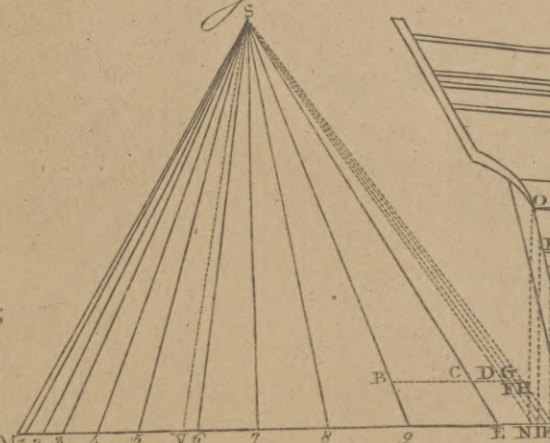


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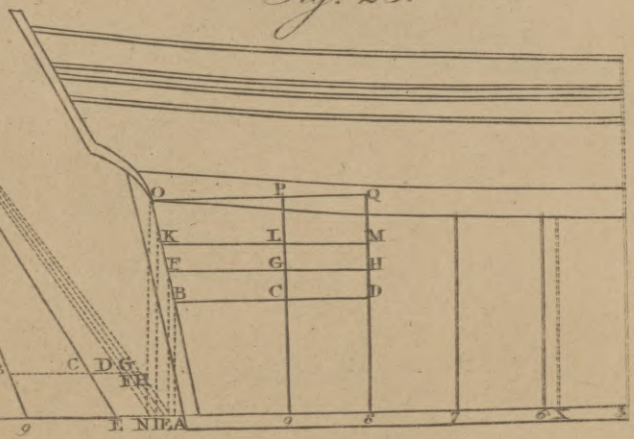


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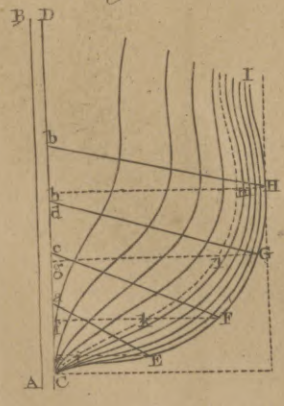


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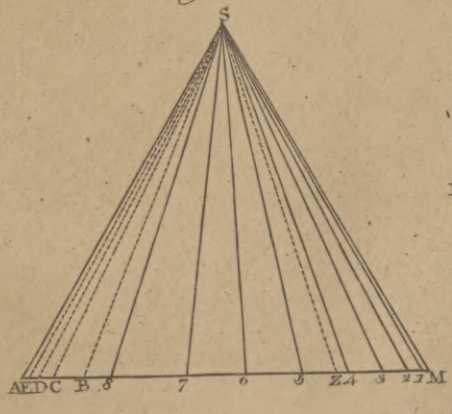
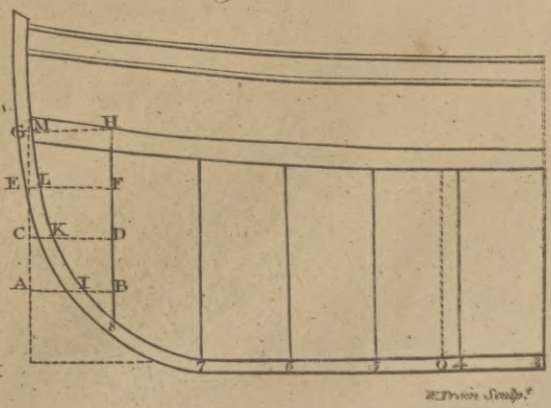


Fig. 26.



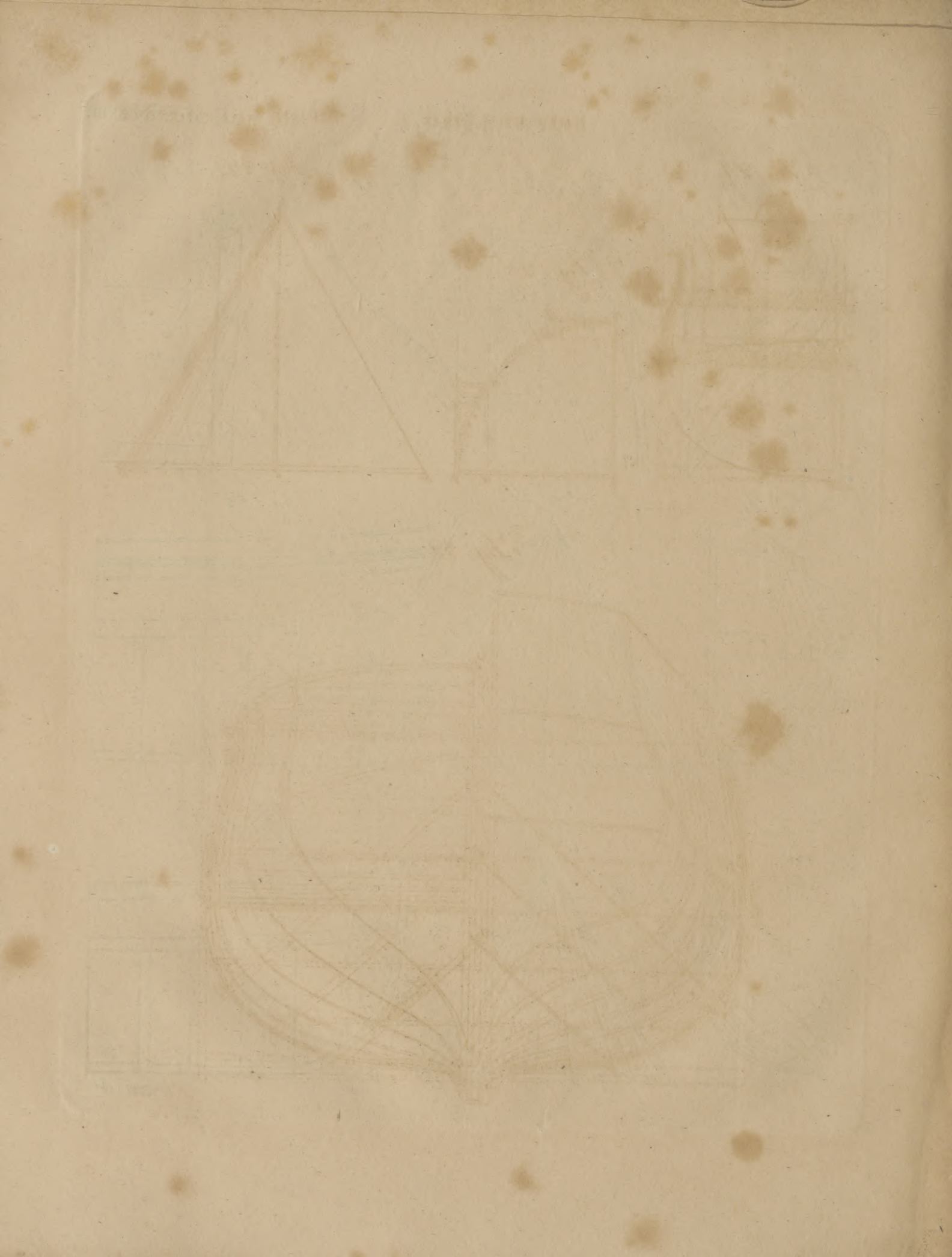


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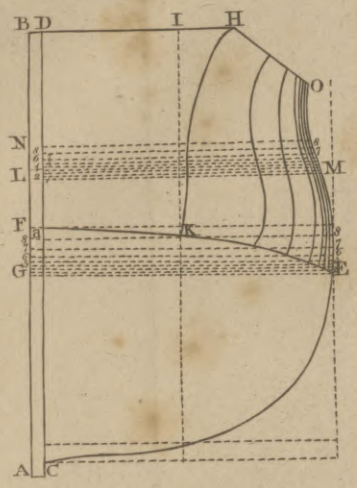


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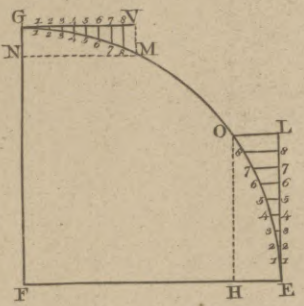


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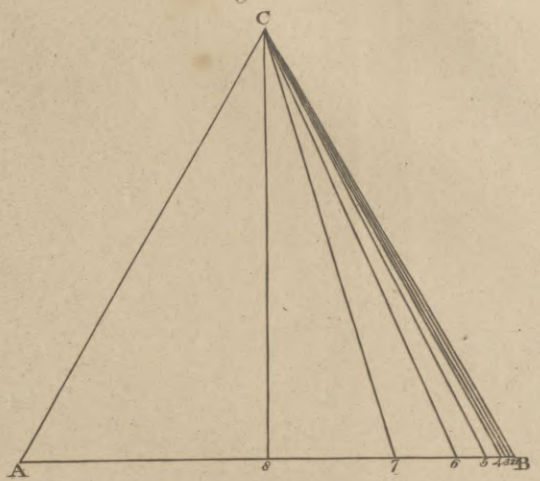


Fig. 32.

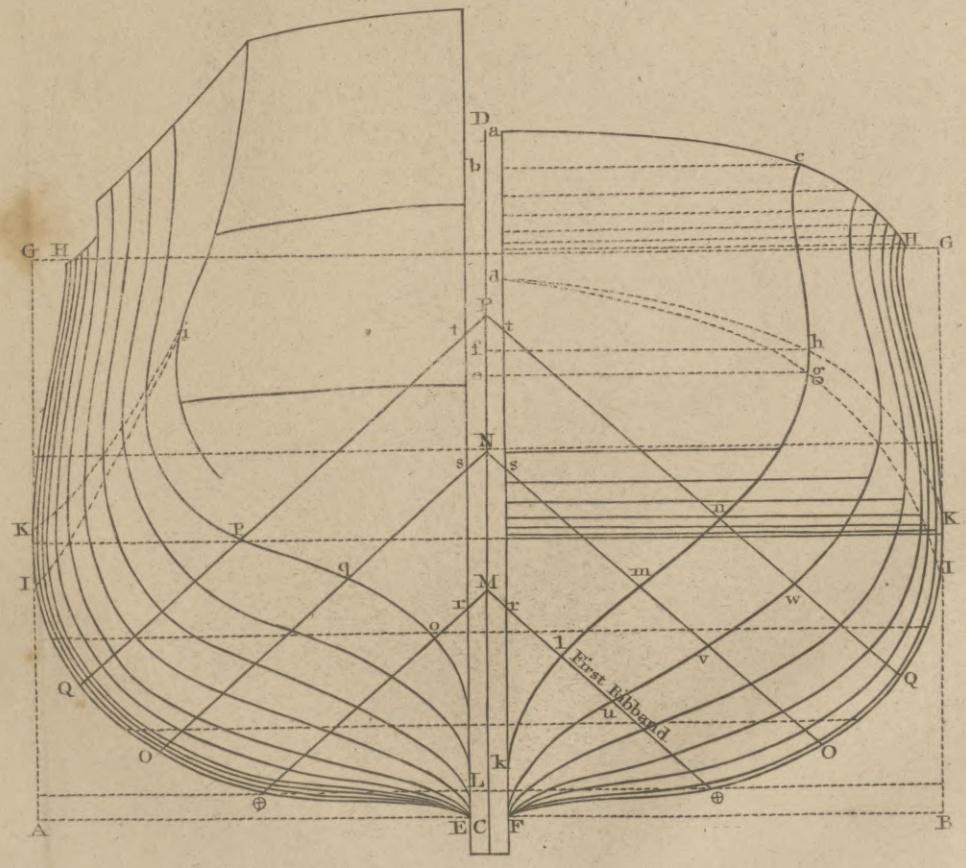


Plate CCCCXC.

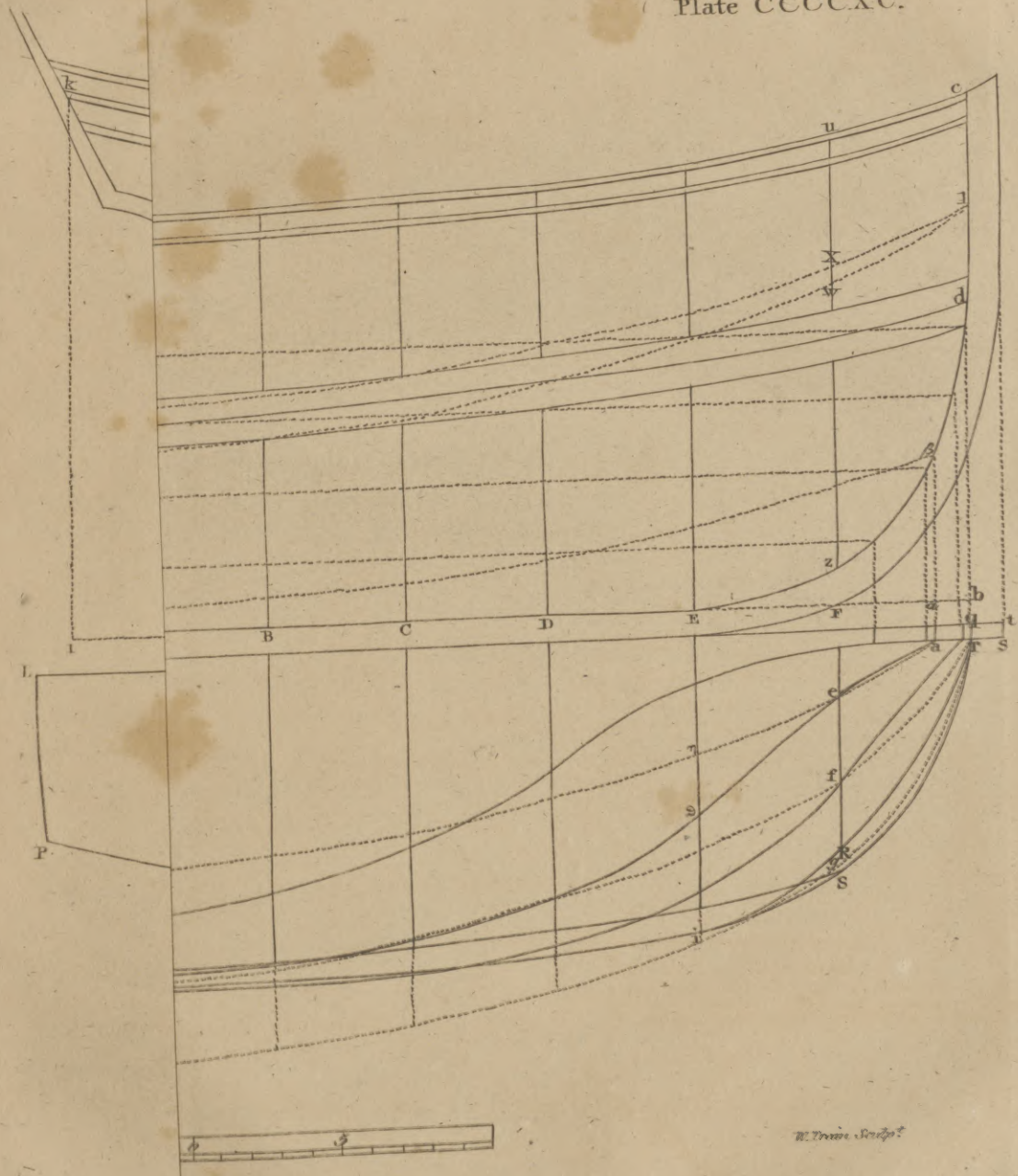
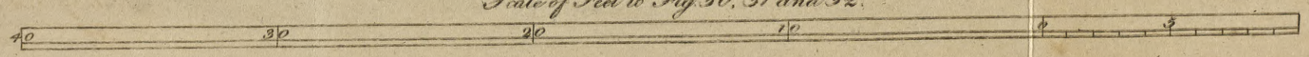


Fig. 30.



Fig. 31.

Scale of Feet to Fig. 30, 31 and 32.



W. Train Sculpt.

Plate CCCCXCI.

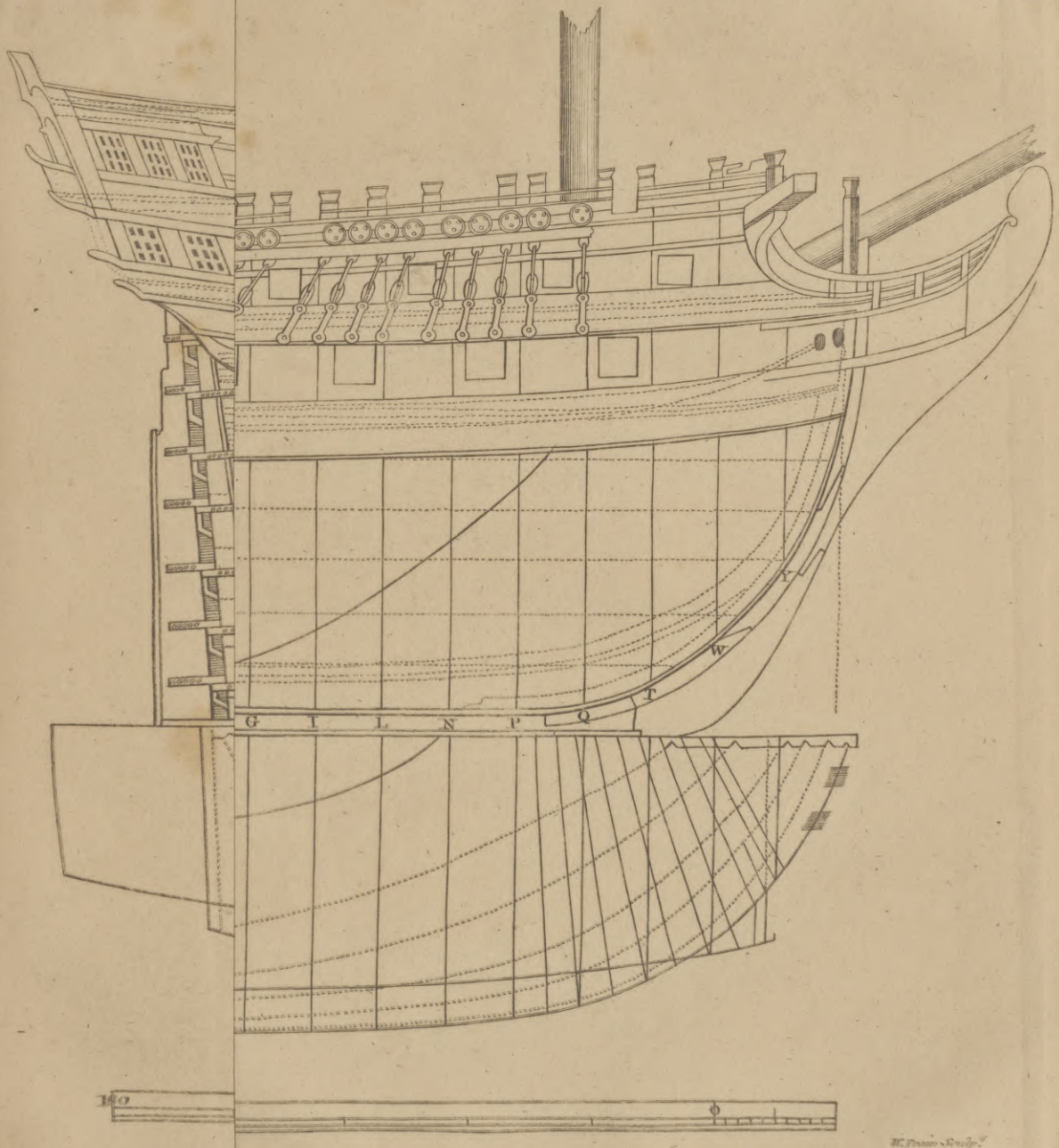


Fig. 33.

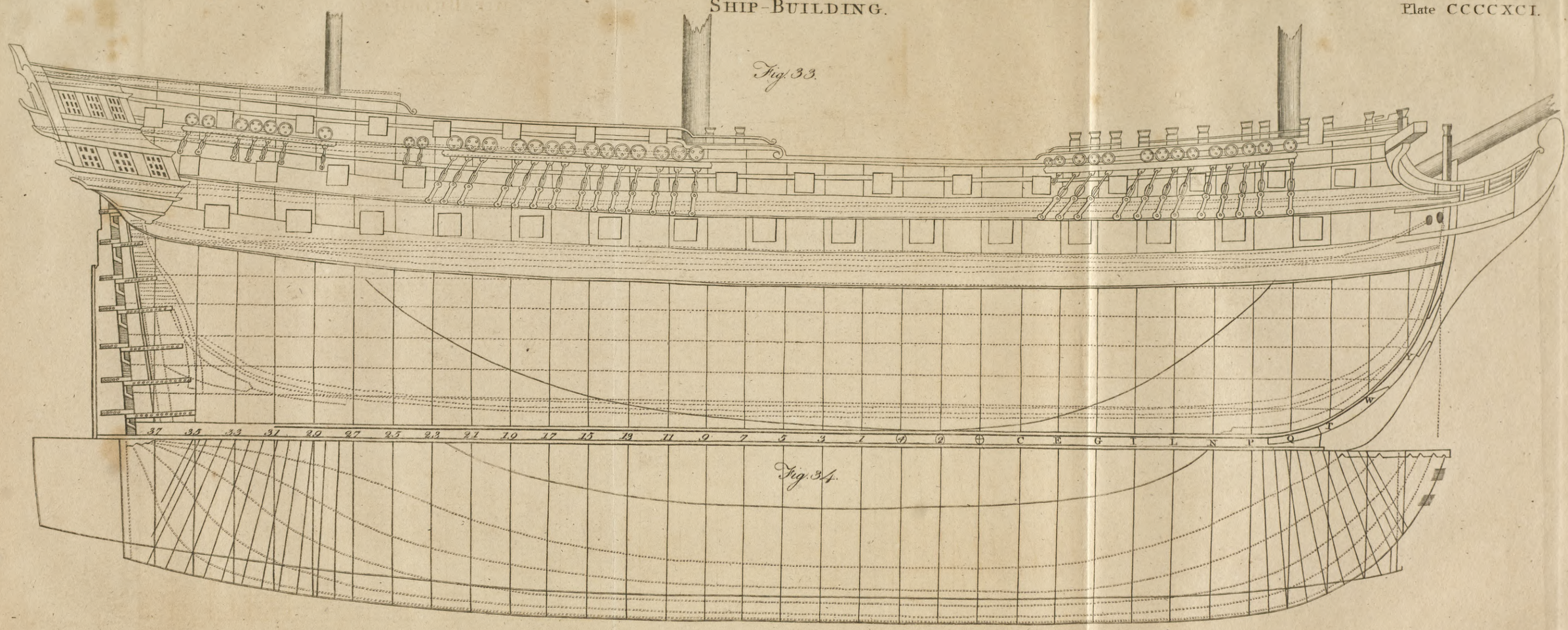
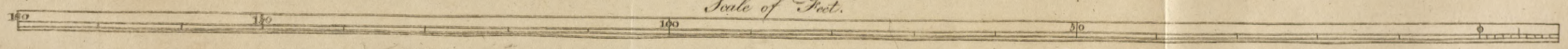
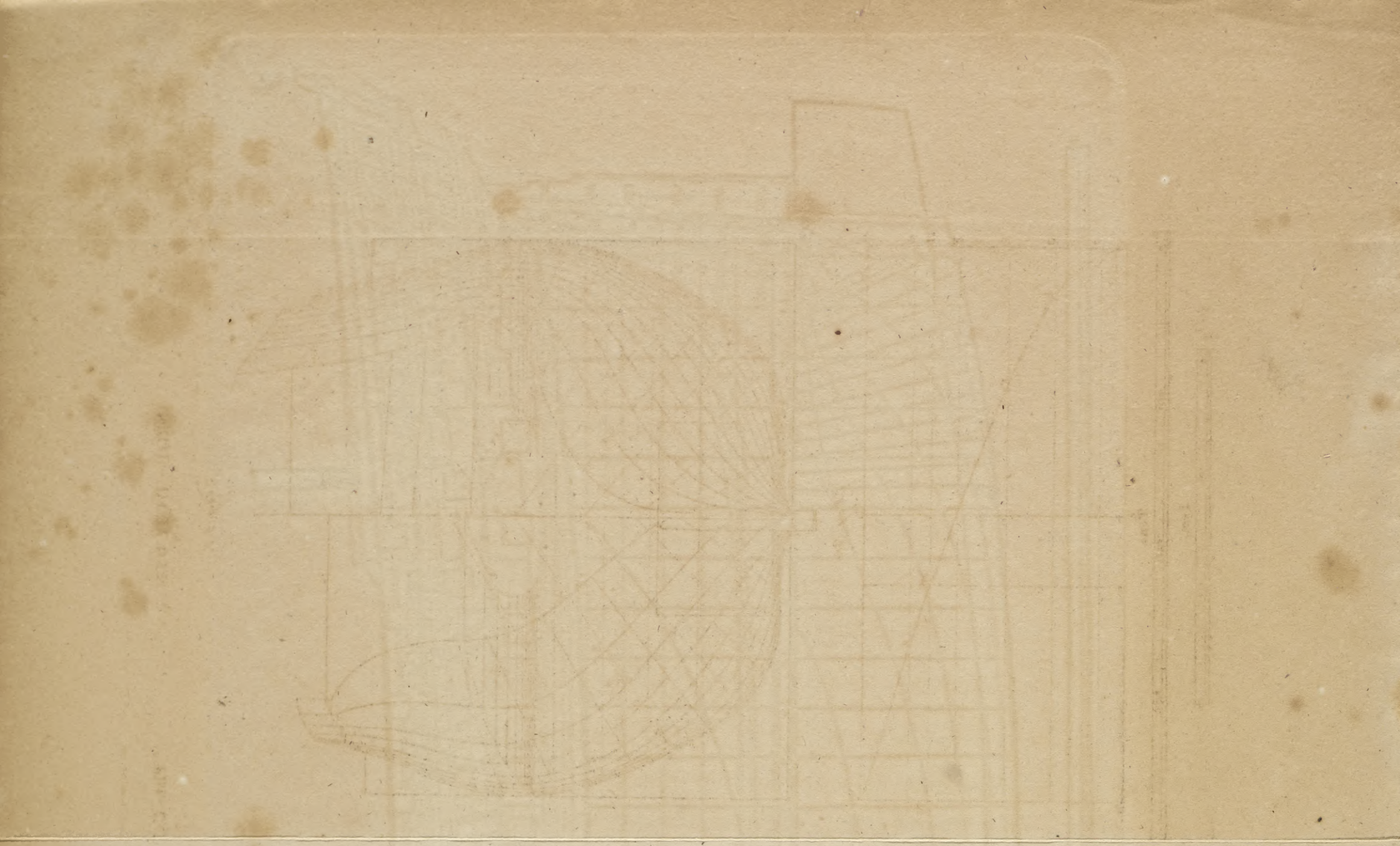


Fig. 34.

Scale of Feet.



W. Doyle Sculp.



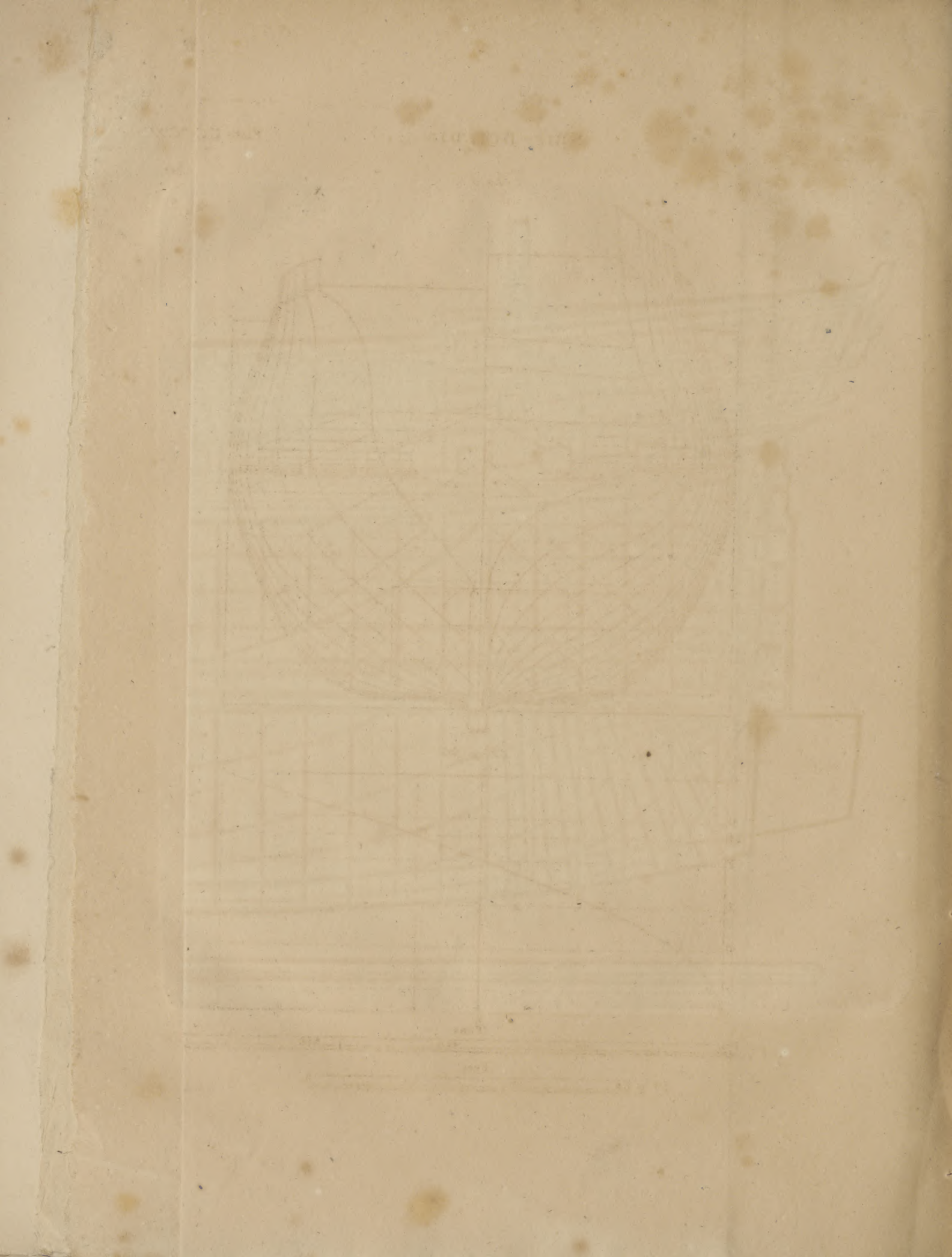


Fig. 35.

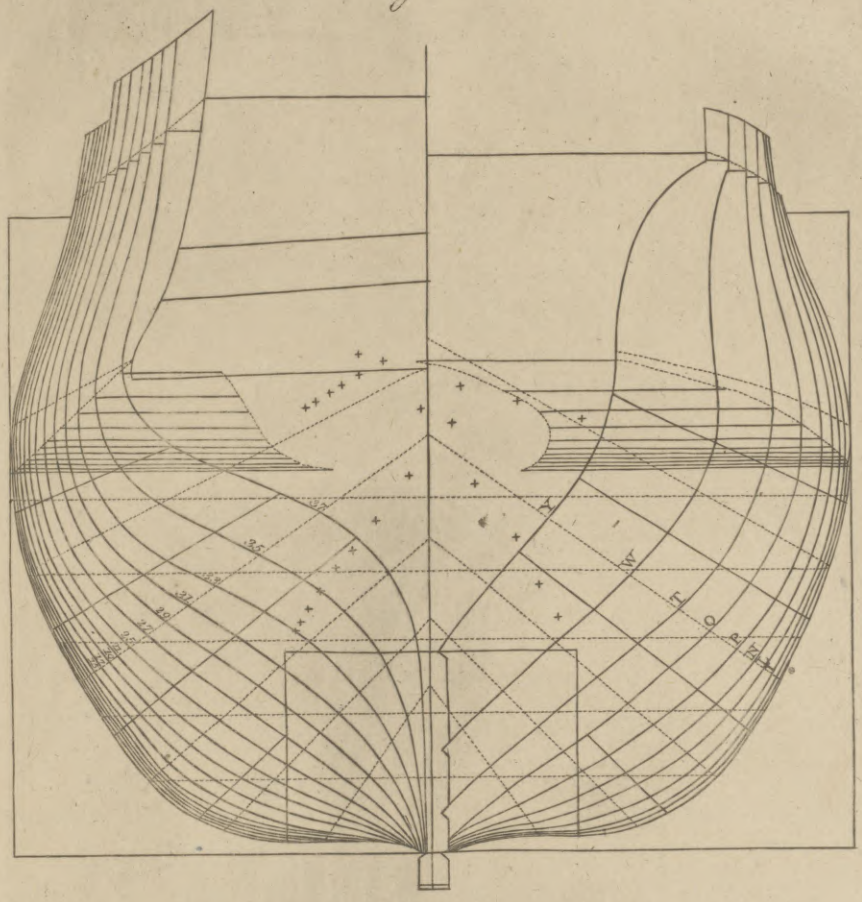
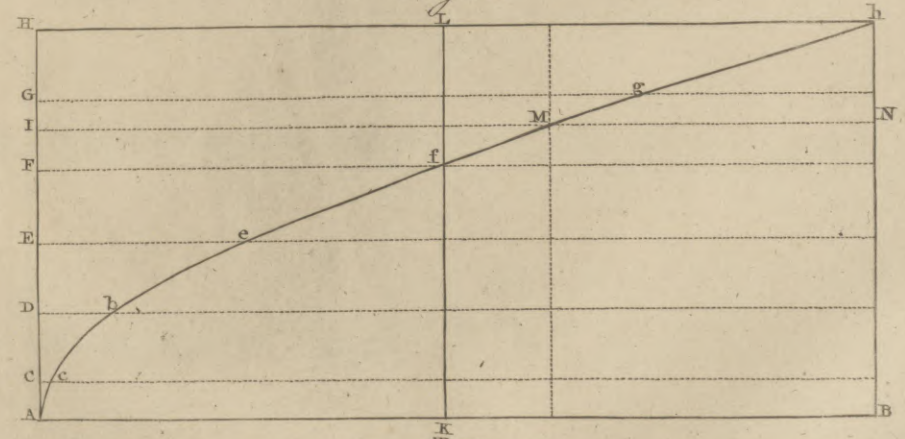


Fig. 36.



W. Hall Sculpt.

Fig. 37.

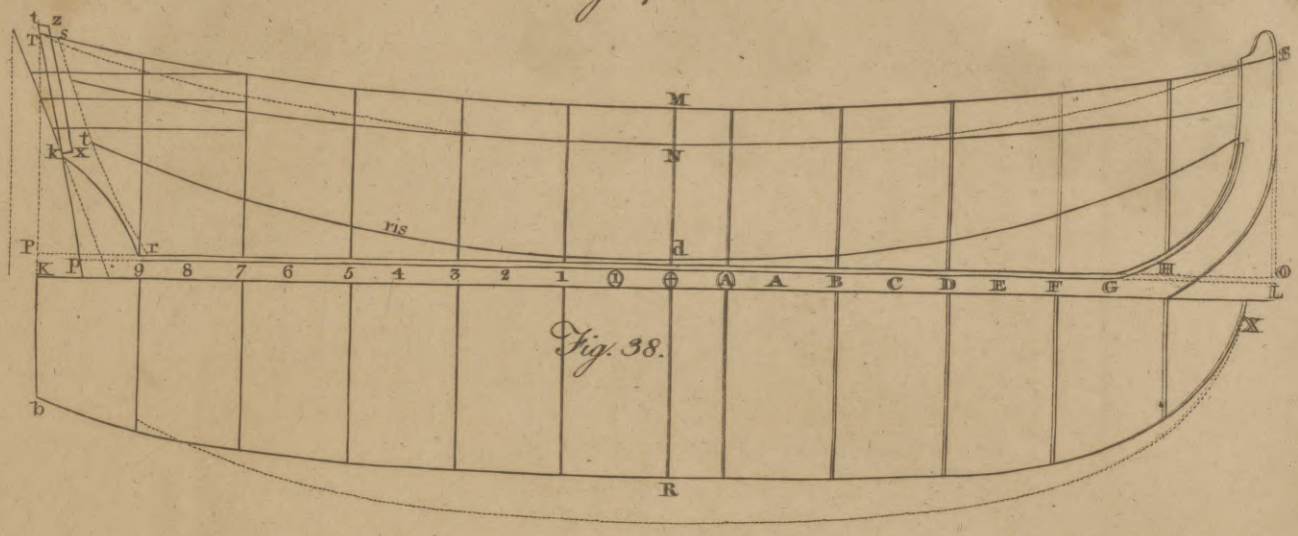


Fig. 38.

Fig. 39.

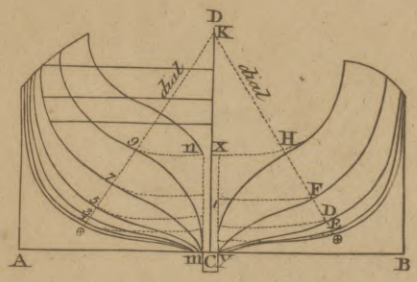


Fig. 40.

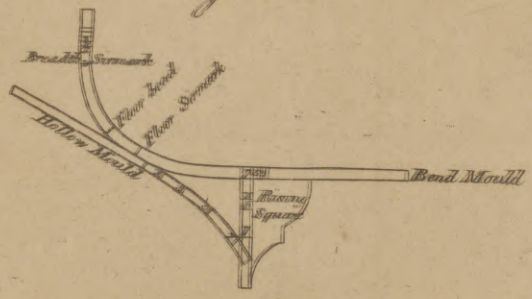


Fig. 41.

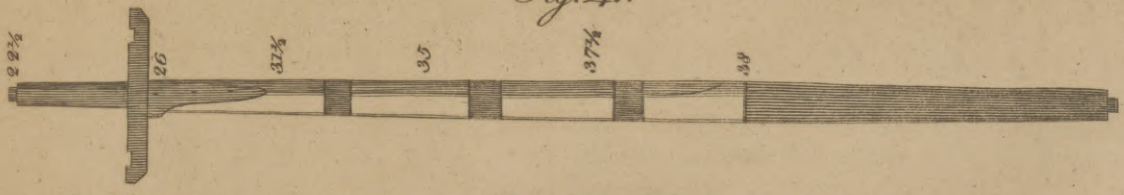


Fig. 42.



Fig. 43.



W. Main Sculp.



Fig. 44.

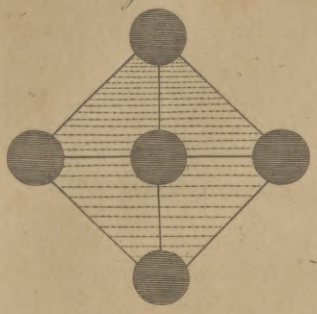


Fig. 45.

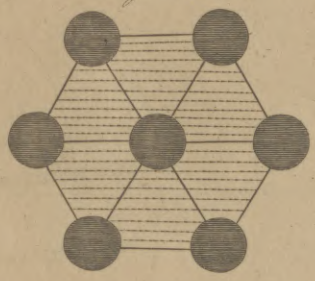


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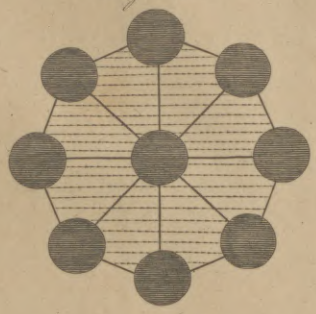


Fig. 47.

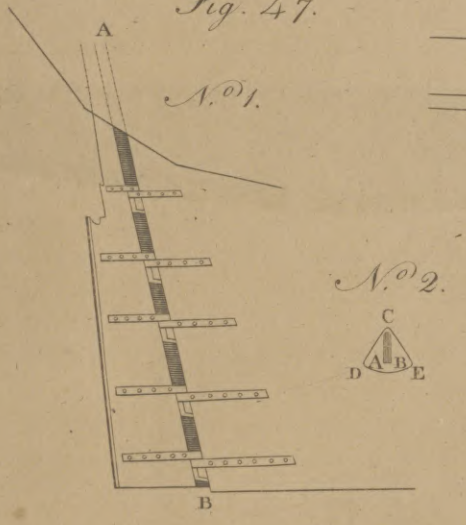


Fig. 48.

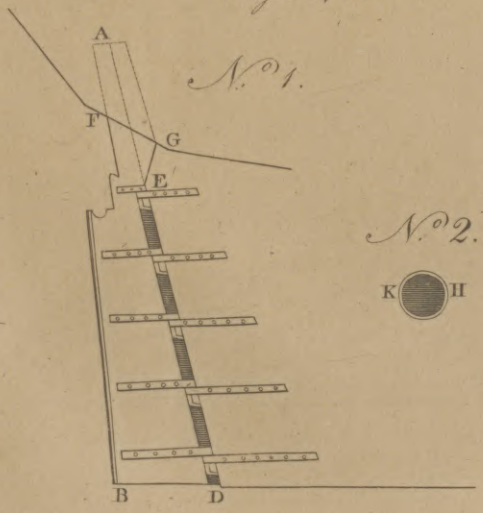


Fig. 49.

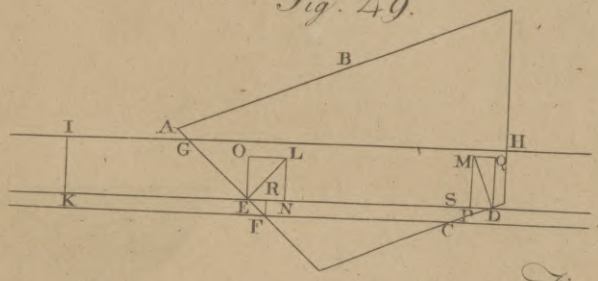
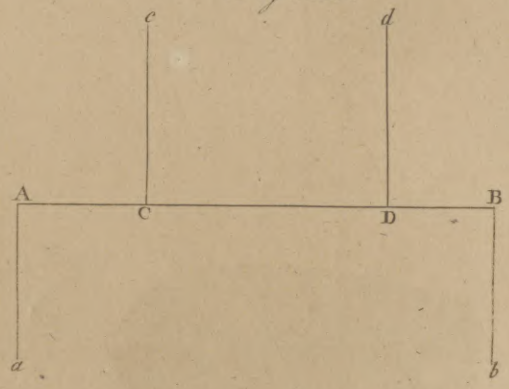
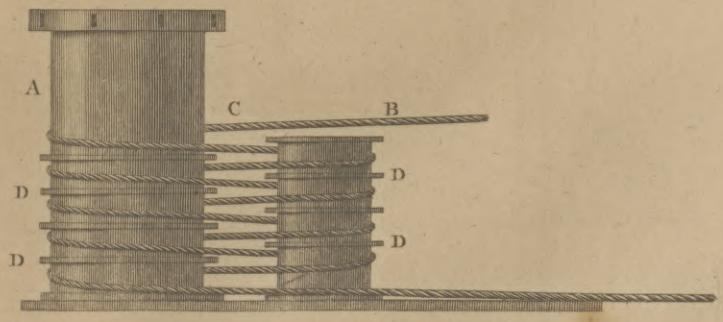


Fig. 50.



BOSWELL'S improved CAPSTAN.



W. Archibald sculp.

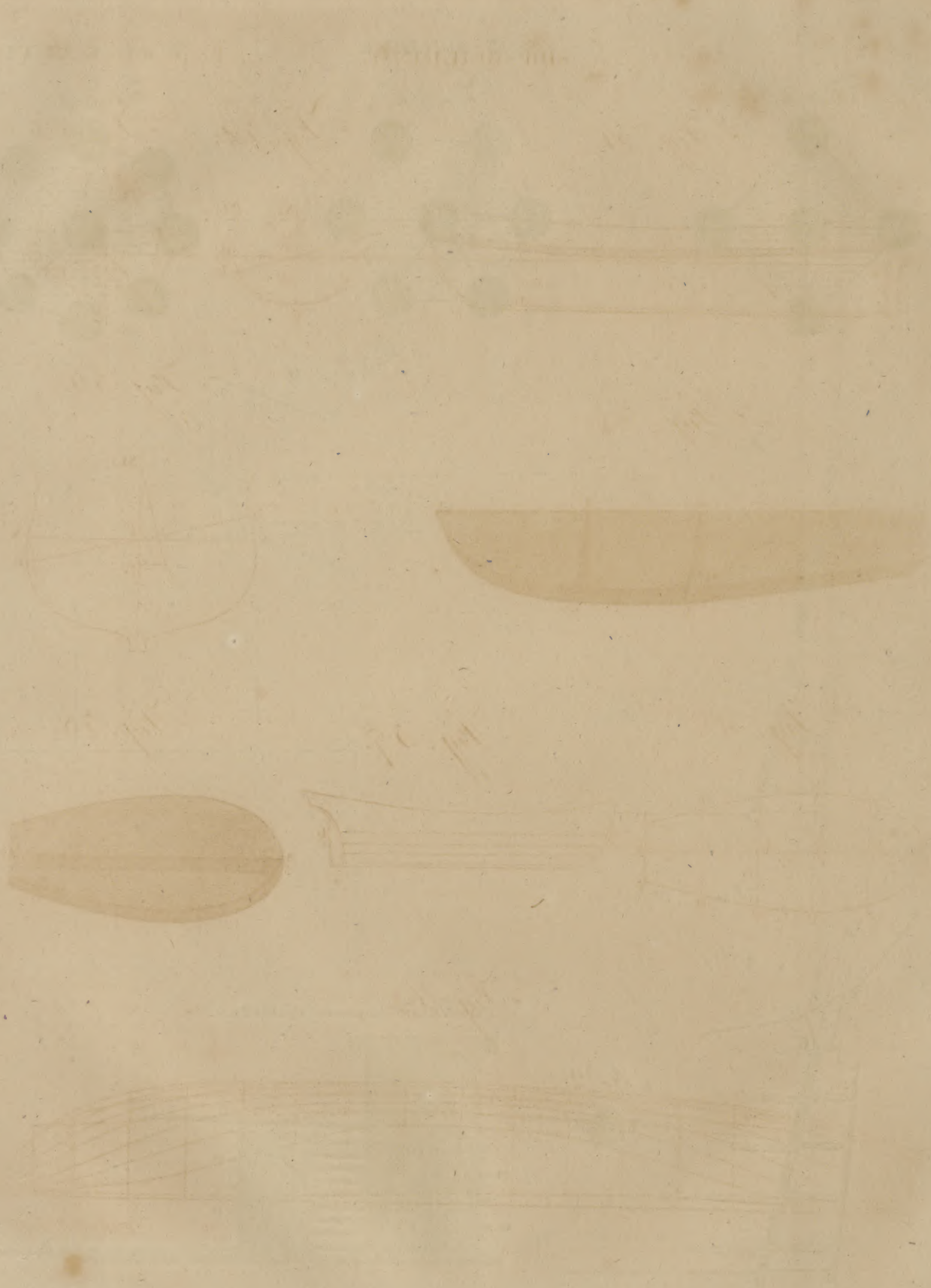


Fig. 51.

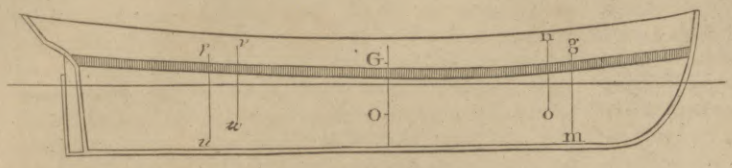


Fig. 52.

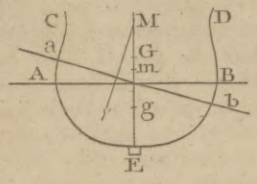


Fig. 53.

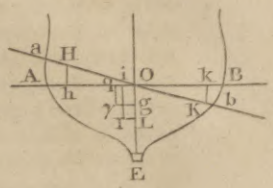


Fig. 54.

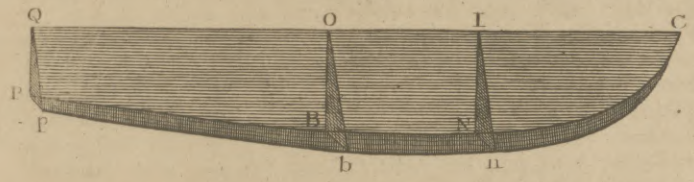


Fig. 55.

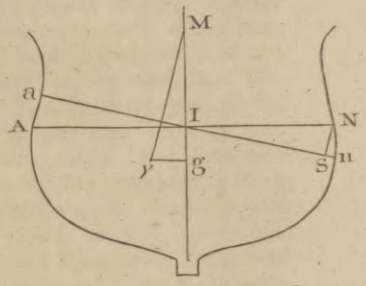


Fig. 56.

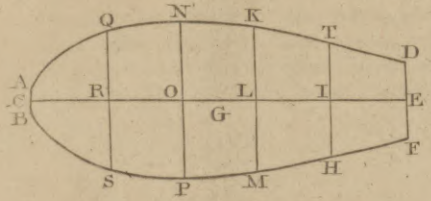


Fig. 57.

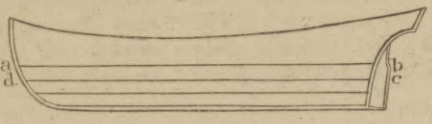


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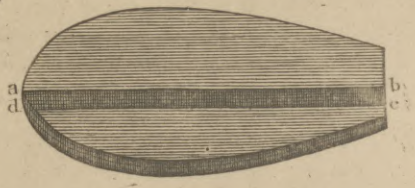
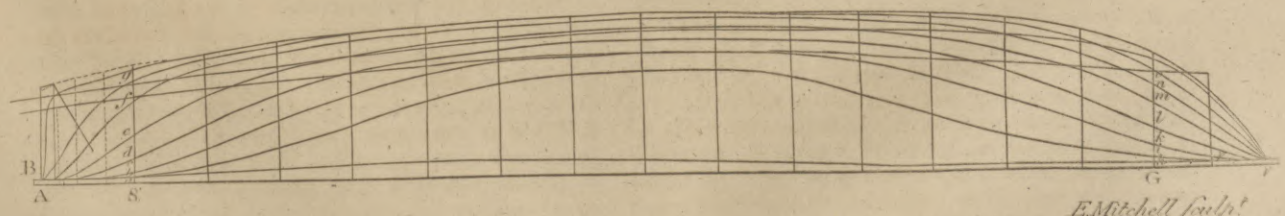


Fig. 59.



E.Mitchell fecit.

Appendix. ſails, fore top and main top ſtayſails, and flying jibs, have clue-pieces two yards long. Square tack ſtayſails, have half a breadth of cloth at the fore part, with a clue-piece containing two yards, and a peek-piece, containing one yard.

" Sails have two holes in each cloth, at the heads and reefs of courſes, topſails, and other ſquare ſails; one hole in every yard in the ſtay of flying jibs, and one in every three quarters of a yard in the ſtays of ſquare tack and other ſtayſails. Theſe are made by an inſtrument called a *pegging awl*, or a ſtabber, and are fenced round by ſtitching the edge to a ſmall grommet, made with log or other line; when finiſhed, they ſhould be well ſtretched or rounded up by a pricker or a marline ſpike. Reef and head holes of large ſails have grommets of twelve-thread line, worked round with 18 to 21 ſtitches; ſmaller ſails have grommets of nine-thread line, with 16 to 18 ſtitches, or as many as ſhall cover the line, and ſmaller holes in proportion. The holes for marling the clues of ſails and the top brims of topſails have grommets of log-line, and ſhould have from 9 to 11 ſtitches; twelve holes are worked in each cloth. Main courſes have marling holes from the clue to the lower bow line cringle up the leech, and from the clue to the firſt buntline cringle on the foot. Fore courſes have marling holes one eighth of the depth of the ſail up the leech, and from the clue to the firſt buntline cringle at the foot. Main and fore topſails have marling holes three feet each way from the clue and at the top-brims. Spritſails, mizen topſails, lower ſtayſails, main and fore top ſtayſails, and jibs, have marling holes two feet each way from the clues. All other ſails are ſewed home to the clues. Marling holes of courſes are at three fourths of the depth of the tablings at the clues from the rope, and thoſe of topſails are at half the depth of the tablings at the clues and top brim from the rope."

The rope, which is ſewed on the edges of ſails to prevent their rending, and which is called *bolt-rope*, ſhould be well made of fine yarn, ſpun from the beſt Riga rhine hemp well topt, and ſewed on with good Engliſh made twine of three threads, ſpun 200 fathom to the pound; the twine in the royal navy is dipped in a compoſition made with bees-wax, 4 lbs. hogs lard 5 lbs. and clear turpentine one pound; and in the merchant ſervice, in tar ſoftened with oil. They ſhould be ſtoved in a ſtove by the heat of a flue, and not in a baker's oven or a ſtove tub; and tarred in the beſt Stockholm tar. The flexibility of them ſhould be always conſidered, in taking in the ſlack, which muſt reſt on the judgment of the ſailmaker. Appendix.

" Bolt ropes of courſes, topſails, and all other ſails, ſhould be neatly ſewed on through every buntline of the rope; and, to avoid ſtretching, the rope muſt be kept tightly twiſted while ſewing on, and care taken that neither too much nor too little ſlack is taken in; they are to be croſs ſtitched at the leeches every twelve inches in length; at every ſeam, and in the middle of every cloth at the foot, with three croſs-ſtitches: four croſs-ſtitches ſhould be taken at all beginnings and faſtenings off; the firſt ſtitch given twice, and the laſt three times. Small ſails have two croſs ſtitches at every ſeam, and three at every faſtening off.

" On main and fore courſes two inches ſlack cloth ſhould be allowed in the head and foot, and one inch and a half in the leeches, in every yard in length. Topſails are allowed 3 inches ſlack in every cloth in the foot, one inch and a half in every yard in the leech, and two inches in every cloth left open in the top brim. Mizen courſes have two inches ſlack in every yard in the foremoſt leech, but none in the after leech or foot. Spritſail courſes have no ſlack cloth. Jibs have four inches ſlack in every yard in the ſtay, one inch in every cloth in the foot, and none in the leech. Stayſails have three inches ſlack in every yard in the ſtay, one inch in every cloth in the foot, but none in the leech. Topgallant ſails have two inches ſlack in every cloth in the foot, and one inch in every yard in the leech. Studding ſails have an inch and a half ſlack in every yard in goring leeches, but no ſlack in ſquare leeches, and one inch in every cloth in the head and foot."

Theſe directions for ſailmaking, we truſt may be uſeful. They are indeed very general, but the ſailmaker will find every inſtruction that he can want in the *Elements of Rigging and Seamanſhip*, a work which we therefore recommend to his attention.

SHI

Ship. *SHIP's Form Gauge*, an inſtrument recommended by Mr Hutchinſon as fit to aſcertain any alteration in the bottom of a ſhip, by its hogging or ſagging; and alſo to regulate the ſtowage of a ſhip.

" All ſhips (ſays he) of any conſequence are built with ſtaunchions fixed from the kelſon to the middle of all the lower-deck beams fore and aft, in order to ſupport them in their exact, regular height, as well as the whole frame of the ſhip in the regular form in which ſhe was built upon the ſtocks; yet notwithſtanding theſe ſtaunchions, it is proved from experience that our ſhips bottoms, hitherto, by the preſſure of water, and improper ſtowage, have generally been hogged upwards, or ſagged downwards, and moſt about the midſhip frame or main body of the ſhip, which is commonly about the fore part of the main hatchway; which naturally makes

SHI

it the beſt place at which to fix the ſhip's form gauge, Ship. where either the hogging or ſagging of her bottom may be obſerved and ſeen ſooneſt and beſt, to regulate the ſtowage of heavy materials to the greateſt advantage, ſo as to keep her bottom nearly in the ſame form in which ſhe was built.

" The gauge I recommend is nothing more than a narrow plate of iron divided into inches and quarters like the ſlide of a carpenter's rule. Let this be fixed to the after ſide of the ſtaunchion now mentioned, with its upper end projecting two or three inches above the ſtaunchion; a groove being cut out for it in the after ſide of the lower-deck beam, and a mark being made (when the ſhip is on the ſtocks) at the part of the beam which correſponds to the o on the gauge. When the ſhip alters in her ſhape, the gauge will ſlide up and

down-

Ship. down in this groove, and the quantity of hogging or ſagging will be pointed out on the gauge by the mark on the beam. The ſtowage may then be ſo managed as to bring this mark to coincide again with the o, or to approach it as near as we ſee neceſſary."

SHIP-Money, was an impoſition charged upon the ports, towns, cities, boroughs, and counties of this realm, in the reign of King Charles I. by writs, commonly called *ſhip-writs*, under the great ſeal of England, in the years 1635 and 1636, for the providing and furniſhing of certain ſhips for the king's ſervice, &c. which was declared to be contrary to the laws and ſtatutes of this realm, the *petition of right* and liberty of the ſubject, by ſtat. 17 Car. I. c. 14. See *Blackſtone's Commentaries*, vol. iv. p. 30.

SHIP-Shape, according to the faſhion of a ſhip, or in the manner of an expert ſailor; as, The maſt is not rigged ſhip-ſhape; Trim your ſails ſhip-ſhape.

Stowing and Trimming of SHIPS, the method of diſpoſing of the cargo in a proper and judicious manner in the hold of a ſhip.

A ſhip's ſailing, ſteering, ſtaying, and wearing, and being lively and comparatively eaſy at ſea in a ſtorm, depends greatly on the cargo, ballaſt, or other materials, being properly ſtowed, according to their weight and bulk, and the proportional dimenſions of the built of the ſhip, which may be made too crank or too ſtiff to paſs on the ocean with ſafety. Theſe things render this branch of knowledge of ſuch conſequence, that rules for it ought to be endeavoured after, if but to prevent, as much as poſſible, the danger of a ſhip overſetting at ſea, or being ſo labourſome as to roll away her maſts, &c. by being improperly ſtowed, which is often the caſe.

When a ſhip is new, it is prudent to conſult the builder, who may be ſuppoſed beſt acquainted with a ſhip of his own planning, and moſt likely to judge what her properties will be, to adviſe how the cargo or materials, according to the nature of them, ought to be diſpoſed of to advantage, ſo as to put her in the beſt ſailing trim; and at every favourable opportunity afterwards it will be proper to endeavour to find out her beſt trim by experiment.

Ships muſt differ in their form and proportional dimenſions; and to make them anſwer their different purpoſes, they will require different management in the ſtowage, which ought not to be left to mere chance, or done at random, as goods or materials happen to come to hand, which is too often the cauſe that ſuch improper ſtowage makes ſhips unfit for ſea: therefore the ſtowage ſhould be conſidered, planned, and contrived, according to the built and properties of the ſhip, which if they are not known ſhould be inquired after. If ſhe is narrow and high-built in proportion, ſo that ſhe will not ſhift herſelf without a great weight in the hold, it is a certain ſign ſuch a ſhip will require a great part of heavy goods, ballaſt, or materials, laid low in the hold, to make her ſtiff enough to bear ſufficient ſail without being in danger of overſetting. But if a ſhip be built broad and low in proportion, ſo that ſhe is ſtiff and will ſupport herſelf without any weight in the hold, ſuch a ſhip will require heavy goods, ballaſt, or materials, ſtowed higher up, to prevent her from being too ſtiff and labourſome at ſea, ſo as to endanger her maſts being rolled away, and the hull worked looſe and made leaky. Ship.

In order to help a ſhip's ſailing, that ſhe ſhould be lively and eaſy in her pitching and aſcending motions, it ſhould be contrived by the ſtowage, that the principal and weightieſt part of the cargo or materials ſhould lie as near the main body of the ſhip, and as far from the extreme ends, fore and aft, as things will admit of. For it ſhould be conſidered, that the roomy part of our ſhips lengthwiſe forms a ſweep or curve near four times as long as they are broad; therefore thoſe roomy parts at and above the water's edge, which are made by a full harping and a broad tranſom to ſupport the ſhip ſteady and keep her from plunging into the ſea, and alſo by the entrance and run of the ſhip having little or no bearing body under for the preſſure of the water to ſupport them, of courſe ſhould not be ſtowed with heavy goods or materials, but all the neceſſary vacancies, broken ſtowage, or light goods, ſhould be at theſe extreme ends fore and aft; and in proportion as they are kept lighter by the ſtowage, the ſhip will be more lively to fall and riſe eaſy in great ſeas; and this will contribute greatly to her working and ſailing, and to prevent her from ſtraining and hogging; for which reaſon it is a wrong practice to leave ſuch a large vacancy in the main hatchway, as is uſual, to coil and work the cables, which ought to be in the fore or after hatchway, that the principal weight may be more eaſily ſtowed in the main body of the ſhip, above the flatteſt and loweſt floorings, where the preſſure of the water acts the more to ſupport it.

Improved Capſtan of SHIPS.—A capſtan has been contrived by Mr Boſwell, which works without requiring the meſſenger or cable coiled around it, to be ever ſurged; an operation which is neceſſary with common capſtans, and is always attended with delay, and frequently with danger. This capſtan has been approved by ſome gentlemen connected with the Britiſh navy. A model of this machine was preſented to the Society for the Encouragement of Arts, and Mr Boſwell received the gold medal of the ſociety for his invention *.

For the information of thoſe unacquainted with maritime affairs, Mr Boſwell gives an account of the manner in which cables are hauled on board of large ſhips. For the purpoſe of ſhewing the advantage of his improved capſtan, cables, he obſerves, above a certain diameter are too inflexible to admit of being coiled round a capſtan; in ſhips where cables of ſuch large dimenſions are neceſſary, a ſmaller cable is employed for this purpoſe, which is called the *meſſenger*, the two ends of which are made faſt together ſo as to form an endleſs rope, which, as the capſtan is turned about, rolls round it in unceaſing ſucceſſion, paſſing on its courſe to the head of the ſhip, and again returning to the capſtan. To this returning part of the meſſenger, the great cable is made faſt by a number of ſmall ropes called nippers, placed at regular intervals; theſe nippers are applied, as the cable enters the hawſe hole, and are again removed as it approaches the capſtan, after which it is lowered into the cable tier.

The meſſenger, or any other rope coiled round the capſtan, muſt deſcend a ſpace at every revolution equal to the diameter of the rope or cable uſed; this circumſtance

* *Tranſ. for* 1807. *Phil. Mag.* xxxi. 267.

Ship. ſtance brings the coils in a few turns to the bottom of the capſtan, when it can no longer be turned round, till the coils are looſened and raiſed up to its other extremity, after which the motion proceeds as before. This operation of ſhifting the place of the coils of the meſſenger on the capſtan is called *ſurging the meſſenger*. It always cauſes conſiderable delay; and when the meſſenger chances to ſlip in changing its poſition, which ſometimes happens, no ſmall danger is incurred by thoſe who are employed about the capſtan.

One method of preventing the neceſſity of ſurging, by placing a horizontal roller beneath the meſſenger when it firſt enters on the capſtan, adds conſiderably to the labour in turning the capſtan, and the great friction which the meſſenger muſt ſuffer, muſt occaſion a very great wear and injury to the meſſenger.

Another method to prevent ſurging was, that for which Mr Plucknet obtained a patent. In this way a number of upright lifters, placed round the capſtan, were made to riſe in ſucceſſion as the capſtan turned round by a circular inclined plane placed beneath them; a method Mr Boſwell thinks ſuperior to the former; but ſtill the wear of the meſſenger from the lateral friction in riſing againſt the whelps of the capſtan remains undiminiſhed.

A third method propoſed by Captain Hamilton, left the lateral friction, and wear of the meſſenger againſt the whelps of the capſtan, as great as in the others, having alſo the inconvenience of cauſing the coils to become looſe as they aſcend, the upper part of the barrel being nearly one third leſs in the diameter than the lower part.

In Mr Boſwell's method of preventing the neceſſity of ſurging, none of the lateral friction of the meſſenger or cable againſt the whelps of the capſtan, can poſſibly take place, and of courſe the wear of the meſſenger occaſioned thereby will be entirely avoided, while it performs its purpoſe with a leſs moving power than any of them.

His method conſiſts in the ſimple addition of a ſecond ſmaller barrel or capſtan of leſs dimenſions to the large one; beſide which it is to be placed in a ſimilar manner, and which need not in general exceed the ſize of a half barrel caſk. The coils of the meſſenger are to be paſſed alternately round the large capſtan and this ſmall barrel, but with their direction reverſed in the different barrels, ſo that they may croſs each other in the intervals between the barrels, in order to have the more extenſive contact with, and better gripe on each barrel. To keep the coils diſtinct, and prevent their touching each other in paſſing from one barrel to the other, projecting rings are faſtened round each barrel at a diſtance from each other equal to about two diameters of the meſſenger, and the thickneſs of the ring. Thoſe rings ſhould be ſo fixed on the two barrels that thoſe on one barrel ſhould be exactly oppoſite the middle of the intervals between thoſe on the other barrel; the only circumſtance which requires particular attention in the conſtruction of this capſtan. The rings ſhould project about as much as the meſſenger from the barrels, which may be formed with whelps, and in every other reſpect, not before mentioned, in the uſual manner for capſtan barrels. The ſmall barrel ſhould be furniſhed with falling palls as well as the large one; a fixed iron ſpindle aſcending from the deck will be the beſt for it, as it will take up leſs room. The ſpindle may be ſecured below the deck, ſo as to bear any ſtrain, as the ſmall barrel need not be much above half the height of the large barrel; the capſtan bars can eaſily paſs over it in heaving round, when it is thought fit to uſe capſtan bars on the ſame deck with the ſmall barrel. As two turns of the meſſenger round both barrels will be at leaſt equivalent to three turns round the common capſtan, it will ſcarcely ever be neceſſary to uſe more than four turns round the two barrels. Ship.

That which prevents the lateral friction of the meſſenger in Mr Boſwell's double capſtan is, that in it each coil is kept diſtinct from the reſt, and muſt paſs on to the ſecond barrel before it can gain the next elevation on the firſt, by which no one coil can have any influence in raiſing or depreſſing another; and what each ſeparate coil deſcends in a ſingle revolution it regains as much as is neceſſary in its paſſage between the barrels when in the air, and free from all contact with any part of the apparatus, it attains a higher elevation without a poſſibility of friction or wear.

It is equally applicable in large and in ſmaller veſſels, in the former of which meſſengers are neceſſary, from the ſize of the cables; but in the latter alſo, where cables can be managed with the ſame eaſe as meſſengers. The ſame principle may be alſo eaſily applied to windlaſſes by having a ſmall horizontal barrel placed parallel to the body of the windlaſs, and having both fitted with rings in the ſame way as is propoſed for the capſtan. The place for the ſmall horizontal barrel is forward, juſt before the windlaſs, and it ſhould alſo be furniſhed with catch polls.

Beſides the advantages now ſtated, the improved capſtan is ſimple in its conſtruction can be fitted up at ſmall expence, is eaſily repaired, and requires but little room.

A repreſents the common capſtan; B, another of ſmaller dimenſions; C the coils of the meſſenger paſſing alternately round the large and ſmall capſtans, but with the direction reverſed on the different barrels, ſo that they may croſs each other in the interval between them; DDDD, are projecting rings round each barrel, ſo fixed on the two barrels, that thoſe on one barrel ſhould be exactly oppoſite the middle of the intervals between thoſe on the other barrel. Plate cccexciv.

Machine for meaſuring a SHIP's *Way.*—We have already deſcribed a variety of machines or inſtruments which have been propoſed for this purpoſe under the article LOG. In this place, therefore, we ſhall confine ourſelves to the machine invented by Francis Hopkinſon, Eſq. Judge of the Admiralty in Pennſylvania.—After having ſhown the fallacies to which the common log, and alſo that particular kind of inſtrument invented by M. Saumarez, are liable, he proceeds to deſcribe his own machine as follows: *Tranſactions of the American Philoſophical Society*, vol. ii. p. 100.

This machine, in its moſt ſimple form, is repreſented by fig. 5. wherein AB is a ſtrong rod of iron moveable on the fulcrum C. D is a thin circular palate of braſs rivetted to the lower extremity of the rod. E a horizontal arm connected at one end with the top of the rod AB by a moveable joint F, and at the other end with the bottom of the index H, by a like moveable joint G. H is the index turning on its centre I, and travelling over the graduated arch K; and L is a ſtrong ſpring, bearing againſt the rod AB, and conſtantly counteracting the preſſure upon the palate D. Plate cccclxxxiii. Fig. 5.

The

Ship. The rod AB ſhould be applied cloſe to the cut-water or ſtem, and ſhould be of ſuch a length that the palate D may be no higher above the keel than is neceſſary to ſecure it from injury when the veſſel is aground, or ſails in ſhoal water. As the bow of the ſhip curves inward towards the keel M, the palate D will be thrown to a diſtance from the bottom of the veſſel, although the perpendicular rod to which it is annexed lies cloſe to the bow above; and therefore the palate will be more fairly acted upon. The arm E ſhould enter the bow ſomewhere near the hawſe hole, and lead to any convenient place in the forecaſtle, where a ſmooth board or plate may be fixed, having the index H, and graduated arch K, upon it.

It is evident from the figure, that as the ſhip is urged forward by the wind, the palate D will be preſſed upon by the reſiſting medium, with a greater or leſs force, according to the progreſſive motion of the ſhip; and this will operate upon the levers ſo as to immediately affect the index, making the leaſt increaſe or diminution of the ſhip's way viſible on the graduated arch; the ſpring L always counteracting the preſſure upon the palate, and bringing back the index, on any relaxation of the force impreſſed.

This machine is advantageouſly placed at the bow of the ſhip, where the current firſt begins, and acts fairly upon the palate, in preference to the ſtern, where the tumultuous cloſing of the water cauſes a wake, viſible to a great diſtance. The palate D is ſunk nearly as low as the keel, that it may not be influenced by the heaping up of the water and the daſhing of the waves at and near the water line. The arch K is to aſcertain how many knots or miles ſhe would run in one hour at her then rate of ſailing. But the graduations on this arch muſt be unequal; becauſe the reſiſtance of the ſpring L will increaſe as it becomes more bent, ſo that the index will travel over a greater ſpace from one to five miles than from five to twelve. Laſtly, The palate, rod, ſpring, and all the metallic parts of the inſtrument, ſhould be covered with a ſtrong varniſh, to prevent ruſt from the corroſive quality of the ſalt water and ſea air.

This machine may be conſiderably improved as follows: Let the rod or ſpear AB (fig. 5.) be a round rod of iron or ſteel, and inſtead of moving on the fulcrum or joint, as at C, let it paſs through and turn freely in a ſocket, to which ſocket the moveable joint muſt be annexed, as repreſented in fig. 6. The rod muſt have a ſhoulder to bear on the upper edge of the ſocket, to prevent its ſlipping quite down. The rod muſt alſo paſs through a like ſocket at F, fig. 5. The joint of the lower ſocket muſt be fixed to the bow of the ſhip, and the upper joint or ſocket muſt be connected with the horizontal arm E. On the top of the uppermoſt ſocket let there be a ſmall circular plate, bearing the 32 points of the mariner's compaſs; and let the top of the rod AB come through the centre of this plate, ſo as to carry a ſmall index upon it, as is repreſented in fig. 7. This ſmall index muſt be fixed to the top of the rod on a ſquare, ſo that by turning the index round the plate, the rod may alſo turn in the ſockets, and of courſe carry the palate D round with it; the little index always pointing in a direction with the face of the palate. The ſmall compaſs plate ſhould not be faſtened to the top of the ſocket, but only fitted tightly on, that it may be moveable at pleaſure. Suppoſe then the intended port to bear S. W. from the place of departure, the palate muſt be turned on the ſocket till the ſouth-weſt point thereon looks directly to the ſhip's bow; ſo that the ſouth-weſt and north-eaſt line on the compaſs plate may be preciſely parallel with the ſhip's keel, and in this poſition the plate muſt remain during the whole voyage. Suppoſe, then, the ſhip to be ſailing in the direct courſe of her intended voyage, with her bowſprit pointing ſouth-weſt. Let the little index be brought to the ſouth-weſt point on the compaſs plate, and the palate D will neceſſarily preſent its broad face toward the port of deſtination; and this it muſt always be made to do, be the ſhip's courſe what it may. If, on account of unfavourable winds, the ſhip is obliged to deviate from her intended courſe, the little index muſt be moved ſo many points from the ſouth-weſt line of the compaſs plate as the compaſs in the binnacle ſhall ſhow that ſhe deviates from her true courſe; ſo that in whatever direction the ſhip ſhall ſail, the palate D will always look full to the ſouth-weſt point of the horizon, or towards the port of deſtination, and conſequently will preſent only an oblique ſurface to the reſiſting medium, more or leſs oblique as the ſhip deviates more or leſs from the true courſe of her voyage. As, therefore, the reſiſtance of the water will operate leſs upon the palate in an oblique than in a direct poſition, in exact proportion to its obliquity, the index H will not ſhow how many knots the veſſel runs in her then courſe, but will indicate how many ſhe gains in the direct line of her intended voyage.—Thus, in fig. 9. if the ſhip's courſe lies in the direction of the line AB, but ſhe can ſail by the wind no nearer than AC; ſuppoſe, then, her progreſſive-motion ſuch as to perform AC equal to five knots or miles in an hour, yet the index H will only point to four knots on the graduated arch, becauſe ſhe gains no more than at that rate on the true line of her voyage, viz. from A to B. Thus will the difference between her real motion and that pointed out by the index be always in proportion to her deviation from her intended port, until ſhe ſails in a line at right angles therewith, as AD; in which caſe the palate would preſent only a thin ſharp edge to the reſiſting medium, the preſſure of which ſhould not be ſufficient to overcome the friction of the machine and the bearing of the ſpring L. So that at whatever rate the ſhip may ſail on that line, yet the index will not be affected, ſhowing that ſhe gains nothing on her true courſe. In this caſe, and alſo when the veſſel is not under way, the action of the ſpring L ſhould cauſe the index to point at O, as repreſented by the dotted lines in fig. 5. and 8.

Ship.

Fig. 9.

As the truth of this inſtrument muſt depend on the equal preſſure of the reſiſting medium upon the palate D, according to the ſhip's velocity, and the proportionable action of the ſpring L, there ſhould be a pin or ſcrew at the joints C and F, ſo that the rod may be readily unſhipped and taken in, in order to clean the palate from any foulneſs it may contract, which would greatly increaſe its operation on the index H, and thereby render the graduated arch falſe and uncertain.

Further, the ſpring L may be expoſed too much to injury from the ſalt water, if fixed on the outſide of the ſhip's bow. To remedy this, it may be brought under cover, by conſtructing the machine as repreſented by fig. 8. where AB is the rod, C the fulcrum or centre of

Fig. 8.

Ship. of its motion, D the palate, E the horizontal arm leading through a ſmall hole into the forecaſtle; M is a ſtrong chain faſtened at one end to the arm E, and at the other to a rim or barrel on the wheel G, which by means of its teeth gives motion to the ſemicircle I and index H. The ſpring L is ſpiral, and encloſed in a box or barrel, like the main-ſpring of a watch. A ſmall chain is fixed to, and paſſing round the barrel, is faſtened by the other end to the fuzee W. This fuzee is connected by its teeth with the wheel G, and counteracts the motion of the palate D. N, N, are the two ſockets through which the rod AB paſſes, and in which it is turned round by means of the little index R. S is the ſmall compaſs plate, moveable on the top of the upper ſocket N. The plate S hath an upright rim round its edge, cut into teeth or notches, ſo that when the index R is a little raiſed up, in order to bring it round to any intended point, it may fall into one of theſe notches, and be detained there; otherwiſe the preſſure of the water will force the palate D from its oblique poſition, and turn the rod and index round to the direction in which the ſhip ſhall be then ſailing.—Should it be apprehended that the palate D, being placed ſo far forward, may affect the ſhip's ſteerage, or obſtruct her rate of ſailing, it ſhould be conſidered that a very ſmall plate will be ſufficient to work the machine, as one of three or four inches in diameter would probably be ſufficient, and yet not large enough to have any ſenſible effect on the helm or ſhip's way.

The greateſt difficulty, perhaps, will be in graduating the arch K, (if the machine is conſtructed as in fig. 5.); the unequal diviſions of which can only be aſcertained by actual experiment on board of each ſhip reſpectively, inaſmuch as the accuracy of theſe graduations will depend on three circumſtances, viz. the poſition of the fulcrum C with reſpect to the length of the rod, the ſize of the palate D, and the ſtrength or bearing of the ſpring L. When theſe graduations, however, are once aſcertained for the machine on board of any one veſſel, they will not want any future alterations, provided the palate D be kept clean, and the ſpring L retains its elaſticity.

But the unequal diviſions of the graduated arch will be unneceſſary, if the machine is conſtructed as in fig. 8; for as the chain goes round the barrel L, and then winds through the ſpiral channel of the fuzee W, the force of the main ſpring muſt operate equally, or nearly ſo, in all poſitions of the index, and conſequently the diviſions of the arch K may in ſuch caſe be equal.

After all, it is not expected that a ſhip's longitude can be determined to a mathematical certainty by this inſtrument. The irregular motions and impulſes to which a ſhip is continually expoſed, make ſuch an accuracy unattainable, perhaps by any machinery: But if it ſhould be found, as we flatter ourſelves it will on fair experiment, that it anſwers the purpoſe much better than the common log, it may be conſidered as an acquiſition to the art of navigation.

It ſhould be obſerved, that in aſcertaining a ſhip's longitude by a time-piece, this great inconvenience occurs, that a ſmall and trifling miſtake in the time makes a very great and dangerous error in the diſtance run: Whereas the errors of this machine will operate no farther than their real amount; which can never be great or dangerous, if corrected by the uſual obſervations made by mariners for correcting the common log. Ship.

A like machine, made in its ſimple form (as at fig. 5.), ſo conſtructed as to ſhip and unſhip, might occaſionally be applied alongſide about midſhips, in order to aſcertain the leeway; which, if rightly ſhown, will give the ſhip's preciſe longitude. As to ſea currents, this and all other machines hitherto invented muſt be ſubject to their influence; and proper allowances muſt be made according to the ſkill and knowledge of the navigator.

Laſtly, Some diſcretion will be neceſſary in taking obſervations from the machine to be entered on the log-book: that is, the moſt favourable and equitable moment ſhould be choſen for the obſervation; not whilſt the ſhip is rapidly deſcending the declivity of a wave, or is ſuddenly checked by a ſtroke of the ſea, or is in the very act of plunging. In all caſes, periods may be found in which a ſhip proceeds with a true average velocity; to diſcover which, a little experience and attention will lead the ſkilful mariner.

It has been obſerved of the machine now deſcribed, that an ingenious mechanic would probably conſtruct it to better advantage in many reſpects. The author only meant to ſuggeſt the principle; experiment alone can point out the beſt method of applying it. He is ſenſible of at leaſt one deficiency, viz. that the little index R, fig. 4. will not be ſtrong enough to retain the palate D in an oblique poſition when the ſhip is ſailing by the wind; more eſpecially as the compaſs plate S, in whoſe notched rim the index R is to fall, is not fixed to, but only fitted tight on the ſocket N. Many means, however, might be contrived to remedy this inconvenience.

SHIP-Wreck. A French author has lately propoſed ſome methods of ſaving the lives of perſons ſhipwrecked near the coaſt. He obſerves, that the moſt proper means for ſaving the crews of ſhipwrecked veſſels is, to eſtabliſh a rope of communication from them to the ſhore. To a bomb or cannon ball ſhould be faſtened the end of a rope, extended afterwards in a zig-zag direction before the mortar or cannon, or ſuſpended on a piece of wood raiſed ſeveral feet. But as it was neceſſary to know if the cord would not break by the force of the exploſion and the velocity of the motion, the author thought it proper to conſult profeſſional men. He accordingly wrote to ſome officers of the artillery in garriſon at La Fere in France, and they almoſt all replied that the rope would infallibly break.

Not deeming this anſwer ſatisfactory, he happily conceived the idea of making the experiment on a ſmall ſcale. He cauſed a piece of the barrel of a muſket to be filed into the form of a ſmall mortar of 18 lines in length internally; and having tied a packthread to a common ball of lead, he made an experiment which perfectly ſucceeded, as did many others which he afterwards repeated, even with the ſtrongeſt charges of powder. This ſucceſs he communicated to the officers of artillery, who replied, that there was a great difference between a quarter of an ounce of powder and four or five pounds employed for a bomb; and were ſtill of opinion that the rope would break.

Having already made experiments, he was ſtill diſpoſed to doubt the truth of this aſſertion, and therefore tried a four-inch mortar with a ball of the ſame calibre, and 18 ounces of powder, with a rope only three or

Ship || Shire.

four lines in diameter, and his ſucceſs was equally flattering as before. Theſe experiments were repeated by order of government at La Fere, four times with an eight-inch mortar, and three times with one of twelve inches, all of which happily ſucceeded. The ſame author goes on to obſerve;

"It ought to be remembered, that a veſſel is never caſt away, or periſhes on the coaſt, but becauſe it is driven thither againſt the will of the captain, and by the violence of the waves and the wind, which almoſt always blows from the ſea towards the ſhore, without which there would be no danger to be apprehended: conſequently in theſe circumſtances, the wind comes always from the ſea, either directly or obliquely, and blows towards the ſhore.

"1ſt, A common paper kite, therefore, launched from the veſſel and driven by the wind to the ſhore, would be ſufficient to ſave a crew of 1500 ſeamen, if ſuch were the number of a ſhip of war. This kite would convey to the ſhore a ſtrong packthread, to the end of which might be affixed a cord, to be drawn on board by means of the ſtring of the kite; and with this cord a rope, or as many as ſhould be neceſſary, might be conveyed to the ſhip.

"2d, A ſmall balloon, of ſix or ſeven feet in diameter, and raiſed by rarefied air, would be alſo an excellent means for the like purpoſe. Being driven by the wind from the veſſel to the ſhore, it would carry thither a ſtring capable of drawing a cord with which ſeveral ropes might be afterwards conveyed to the veſſel. Had not the diſcovery of Montgolfier produced any other benefit, it would be entitled on this account to be conſidered as of great importance.

"3dly, A ſky-rocket, of a large diameter, would be of equal ſervice. It would alſo carry, from the veſſel to the ſhore, a ſtring capable of drawing a rope after it.

"Laſtly, A fourth plan for ſaving the crew of a ſhipwrecked veſſel, is that of throwing from the veſſel into the ſea an empty caſk with a cord attached to it. The wind and the waves would drive the caſk to the ſhore, and afford the means of eſtabliſhing that rope of communication already mentioned."

The author juſt quoted ſays, that he announced his diſcovery in a French journal in January 1794. It is, however, to be obſerved, that the method he propoſes of conveying a rope to the ſhore, by faſtening it to a bullet or bomb, to be afterwards fired from a cannon or mortar, was propoſed ſome years ago by a ſerjeant or officer of artillery at Woolwich, and it is ſaid, ſimilar experiments were made at Portſmouth, and ſucceeded *.

* *Phil. Mag.* vol. iv. p. 247.

SHIRAUZ. See SCHIRAS.

SHIRE, is a Saxon word ſignifying a diviſion; but a county, *comitatus*, of the ſame import, is plainly derived from *comes*, "the count of the Franks;" that is, the earl or alderman (as the Saxons called him) of the ſhire, to whom the government of it was entruſted. This he uſually exerciſed by his deputy, ſtill called in Latin *vice-comes*, and in Engliſh the *ſheriff*, *ſhrieve*, or *ſhire-reeve*, ſignifying the "officer of the ſhire;" upon whom, in proceſs of time, the civil adminiſtration of it totally devolved. In ſome counties there is an intermediate diviſion between the ſhire and the hundred; as lathes in Kent and rapes in Suſſex, each of them containing about three or four hundred a-piece. Theſe had formerly their lathe-reeves and rape-reeves, acting in ſubordination to the ſhire-reeve. Where a county is divided into three of theſe intermediate juriſdictions, they are called *trithings*, which were anciently governed by a trithing reeve. Theſe trithings ſtill ſubſiſt in the large county of York, where, by an eaſy corruption, they are denominated *ridings*; the north, the eaſt, and the weſt ridings.

Shirl || Shoad.

SHIRL, SHORL, or COCKLE, a ſpecies of mineral. See MINERALOGY *Index*.

SHIRT, a looſe garment, commonly of linen, worn next the body.—Some doubt the propriety of changing the linen when a perſon is ſick. Clean linen promotes perſpiration; and it may be renewed as often as the patient pleaſes, whether the diſorder be of the acute or the chronical kind. Except during a criſis in fevers, whilſt the patient is in a ſweat, a change of linen, if well dried and warmed, may be daily uſed.

Shirts were not worn by the Jews, Greeks, or Romans, but their place was ſupplied by thin *tunicæ* of wool. The want of linen among the ancients made frequent waſhings and ablutions neceſſary.

SHIVER, a name given by miners to ſome of the ſtrata which accompany coal. See SCHISTUS, MINERALOGY *Index*.

SHIVERS, in the ſea language, names given to the little rollers, or round wheels of pulleys.

SHOAD, among miners, denotes a train of metalline ſtones, ſerving to direct them in the diſcovery of mines.

SHOAD-Stones, a term uſed by the miners of Cornwall and other parts of this kingdom, to expreſs ſuch looſe maſſes of ſtone as are uſually found about the entrances into mines, ſometimes running in a ſtraight courſe from the load or vein of ore to the ſurface of the earth.

Theſe are ſtones of the common kinds, appearing to have been pieces broken from the ſtrata or larger maſſes; but they uſually contain mundic, or marcaſitic matter, and more or leſs of the ore to be found in the mine. They appear to have been at ſome time rolled about in water, their corners being broken off, and their ſurface ſmoothed and rounded.

The antimony mines in Cornwall are always eaſily diſcovered by the ſhoad-ſtones, theſe uſually lying up to the ſurface, or very nearly ſo; and the matter of the ſtone being a white ſpar, or debaſed cryſtal, in which the native colour of the ore, which is a ſhining bluiſh black, eaſily diſcovers itſelf in ſtreaks and threads.

Shoad-ſtones are of ſo many kinds, and of ſuch various appearances, that it is not eaſy to deſcribe or know them; but the miners, to whom they are of the greateſt uſe in the tracing or ſearching after new mines, diſtinguiſh them from other ſtones by their weight; for if very ponderous, though they look ever ſo much like common ſtones, there is great reaſon to ſuſpect that they contain ſome metal. Another mark of them is their being ſpongy and porous; this is a ſign of eſpecial uſe in the tin countries; for the tin ſhoad-ſtones are often ſo porous and ſpongy, that they reſemble large bodies thoroughly calcined. There are many other appearances of tin ſhoads, the very hardeſt and firmeſt ſtones often containing this metal.

When the miners, in tracing a ſhoad up hill, meet with ſuch odd ſtones and earths that they know not well what to make of them, they have recourſe to vanning, that is, they calcine and powder the ſtone, clay, or whatever elſe is ſuppoſed to contain the metal; and then

Shoal || Shoe.

then waſhing it in an inſtrument, prepared for that purpoſe, and called a *vanning ſhovel*, they find the earthy matter waſhed away, and of the remainder, the ſtony or gravelly matter lies behind, and the metalline matter at the point of the ſhovel. If the perſon who performs this operation has any judgement, he eaſily diſcovers not only what the metal is that is contained in the ſhoad, but alſo will make a very probable gueſs at what quantity the mine is likely to yield of it in proportion to the ore.

SHOAL, in the ſea language, denotes a place where the water is ſhallow; and likewiſe a great quantity of fiſhes, ſuch as a *ſhoal of herrings*.

SHOCK, in *Electricity*. The effect of the exploſion of a charged body, that is, the diſcharge of its electricity on any other body, is called the *electric ſhock*.

SHOE, a covering for the foot, uſually of leather.

SHOES, among the Jews, were made of leather, linen, ruſh, or wood; thoſe of ſoldiers were ſometimes of braſs or iron. They were tied with thongs which paſſed under the ſoles of the feet. To put off their ſhoes was an act of veneration; it was alſo a ſign of mourning and humiliation: to bear one's ſhoes, or to untie the latchets of them, was conſidered as the meaneſt ſervice.

Among the Greeks ſhoes of various kinds were uſed. Sandals were worn by women of diſtinction. The Lacedemonians wore red ſhoes. The Grecian ſhoes generally reached to the middle of the leg. The Romans uſed two kinds of ſhoes; the *calceus*, which covered the whole foot ſomewhat like our ſhoes, and was tied above with latchets or ſtrings; and the *ſolea* or ſlipper, which covered only the ſole of the foot, and was faſtened with leathern thongs. The calceus was always worn along with the *toga* when a perſon went abroad: ſlippers were put on during a journey and at feaſts, but it was reckoned effeminate to appear in public with them. Black ſhoes were worn by the citizens of ordinary rank, and white ones by the women. Red ſhoes were ſometimes worn by the ladies, and purple ones by the coxcombs of the other ſex. Red ſhoes were put on by the chief magiſtrates of Rome on days of ceremony and triumphs. The ſhoes of ſenators, patricians, and their children, had a creſcent upon them which ſerved for a buckle; theſe were called *calcei lunati*. Slaves wore no ſhoes; hence they were called *cretati* from their duſty feet. Phocion alſo and Cato Uticenſis went without ſhoes. The toes of the Roman ſhoes were turned up in the point; hence they were called *calcei roſtrati*, *repandi*, &c.

In the 9th and 10th centuries the greateſt princes of Europe wore wooden ſhoes, or the upper part of leather and the ſole of wood. In the reign of William Rufus, a great beau, Robert, ſurnamed *the horned*, uſed ſhoes with long ſharp points, ſtuffed with tow, and twiſted like a ram's horn. It is ſaid the clergy, being highly offended, declaimed againſt the long-pointed ſhoes with great vehemence. The points, however, continued to increaſe till, in the reign of Richard II. they were of ſo enormous a length that they were tied to the knees with chains, ſometimes of gold, ſometimes of ſilver. The upper parts of theſe ſhoes in Chaucer's time were cut in imitation of a church window. The long-pointed ſhoes were called *crackowes*, and continued in faſhion for three centuries in ſpite of the bulls of popes, the decrees of councils, and the declamations of the clergy. At length the parliament of England interpoſed by an act A. D. 1463, prohibiting the uſe of ſhoes or boots with pikes exceeding two inches in length, and prohibiting all ſhoemakers from making ſhoes or boots with longer pikes under ſevere penalties. But even this was not ſufficient: it was neceſſary to denounce the dreadful ſentence of excommunication againſt all who wore ſhoes or boots with points longer than two inches. The preſent faſhion of ſhoes was introduced in 1633, but the buckle was not uſed till 1670. Shoe.

In Norway they uſe ſhoes of a particular conſtruction, conſiſting of two pieces, and without heels; in which the upper leather ſits cloſe to the foot, the ſole being joined to it by many plaits or folds.

The ſhoes or ſlippers of the Japaneſe, as we are informed by Profeſſor Thunberg, are made of rice-ſtraw woven, but ſometimes for people of diſtinction of fine ſlips of ratan. The ſhoe conſiſts of a ſole, without upper leather or hind-piece; forwards it is croſſed by a ſtrap, of the thickneſs of one's finger, which is lined with linen; from the tip of the ſhoe to the ſtrap a cylindrical ſtring is carried, which paſſes between the great and ſecond toe, and keeps the ſhoe faſt on the foot. As theſe ſhoes have no hind-piece, they make a noiſe when people walk in them like ſlippers. When the Japaneſe travel, their ſhoes are furniſhed with three ſtrings made of twiſted ſtraw, with which they are tied to the legs and feet, to prevent them from falling off. Some people carry one or more pairs of ſhoes with them on their journeys, in order to put on new, when the old ones are worn out. When it rains, or the roads are very dirty, theſe ſhoes are ſoon wetted through, and one continually ſees a great number of worn-out ſhoes lying on the roads, eſpecially near the brooks, where travellers have changed their ſhoes after waſhing their feet. Inſtead of theſe, in rainy or dirty weather they wear high wooden clogs, which underneath are hollowed out in the middle, and at top have a band acroſs like a ſtirrup, and a ſtring for the great toe; ſo that they can walk without ſoiling their feet. Some of them have their ſtraw ſhoes faſtened to theſe wooden clogs. The Japaneſe never enter their houſes with their ſhoes on; but leave them in the entry, or place them on the bench near the door, and thus are always barefooted in their houſes, ſo as not to dirty their neat mats. During the time that the Dutch live at Japan, when they are ſometimes under an obligation of paying viſits at the houſes of the Japaneſe, their own rooms at the factory being likewiſe covered with mats of this kind, they wear, inſtead of the uſual ſhoes, red, green, or black ſlippers, which, on entering the houſe they pull off: however, they have ſtockings on, and ſhoes made of cotton ſtuff with buckles in them, which ſhoes are made at Japan, and can be waſhed whenever they are dirty. Some have them of black ſatin, in order to avoid waſhing them.

SHOE of an Anchor, a ſmall block of wood, convex on the back, and having a ſmall hole, ſufficient to contain the point of the anchor fluke, on the foreſide. It is uſed to prevent the anchor from tearing or wounding the planks on the ſhip's bow, when aſcending or deſcending; for which purpoſe the ſhoe ſlides up and down along the bow between the fluke of the anchor and the planks, as being preſſed cloſe to the latter by the weight of the former.

To SHOE an Anchor, is to cover the flukes with a

Shoemakers. broad triangular piece of plank, whose area or superfices is much larger than that of the flukes. It is intended to give the anchor a stronger and surer hold of the bottom in very soft and oozy ground.

SHOEMAKERS MACHINE for working at in a standing posture. A machine for this purpose was invented by Mr Thomas Parker, who, on the 22d of November, 1804, attended a committee appointed by the Society of Arts, and informed them that he had made use of this apparatus for twelve months, and found it very useful. He observed that all the work of shoe-making may be done with it standing; but that in some parts thereof he found an advantage in using along with it a high stool; and that prior to the use of this machine, he never saw or heard of a similar invention; and that he found it of great service to his health.

He estimated the cost of such a machine at two guineas.

Plate CCCCXCVI. fig. 1. T, a bench standing on four legs, about four feet from the ground.

Plate cccxcvi. Fig. 1.

V, A circular cushion affixed to the bench, in the centre of which cushion is an open space quite through the bench, through which hole a leather strap U is brought up from below. This strap holds the work and last firm upon the cushion in any position required, by means of the workman's foot placed upon the treadle W.

X, Shews the last upon the cushion, with the strap holding it firm.

Y, An implement used in closing boots.

Z, A small flat leather cushion, useful in adjusting the last and strap.

L, The shoe-last shewn separate from the cushion. The round cushion is formed of a circular piece of wood, covered with leather or stuffed with wool or hair to give it some elasticity.

Another machine for the same purpose has been invented by Mr Holden of Fettleworth in Suffex, and the following account of it was presented to the Society of Arts. He observes that the sitting posture had so greatly injured his health, as to render it necessary to give up his business, and in this difficulty he invented the machine which he found to answer the purpose fully, as it enabled him to resume his work with the recovery of his health. He recommends it as the quickest way of closing all the thread work, and he adds, that he has made 1800 or 2000 pairs of shoes with the machine, and still continues to employ it. The following is a description of the machine.

Fig. 2. Fig. 2. A, The bed for the closing block, and to lay the shoe in, whilst sewing.

B, The closing block.

C, A loose bed to lay the shoe in whilst stitching; the lower part of which is here exhibited reversed, to shew how it is placed in the other bed A.

D, The hollow or upper part of the loose bed C, in which the shoe is laid while stitching.

E, A table on which the tools wanted are to be laid.

F, An iron semi-circle, fixed to each end of the bed A, to allow the bed to be raised or depressed. This half circle moves in the block G.

H, Another iron semi-circle, with notches, which catch upon a tooth in the centre of the block, to hold the bed in any angle required. This semi-circle moves sidewise on two hooks in staples at each end of the bed.

I, The tail or stem of the bed A, moving in a cylindrical hole in the pillar, enabling the bed to be turned in any required direction, and which, with the movement F, enables the operator to place the shoe in any position necessary.

Shoemakers || Shooting.

K, The pillar, formed like the pillar of a clawtable, excepting the two side legs being in a direct line, and the other leg at a right angle with them.

L, The semi-circle H, shewn separately, to explain how it is connected with the staples, and how the notches are formed.

M, The tail or stem of the bed A, and the lower part of the bed N, shewn separately, to explain how the upper part of the bed is raised or depressed occasionally.

Horse-SHOE. See FARRIERY, N° 131.

SHOOTING, in the military art. See ARTILLERY, GUNNERY, and PROJECTILES.

1 Shooting in sportmanship.

SHOOTING, in sportmanship, the killing of game by the gun, with or without the help of dogs.

Under this article we shall lay down all the rules which are necessary to be observed in order to render one accomplished and successful in the art of shooting.

2 Directions for choosing a fowling-piece.

The first thing which the sportsman ought to attend to is the choice of his fowling-piece. Conveniency requires that the barrel be as light as possible, at the same time it ought to possess that degree of strength which will make it not liable to burst. Experience has proved, that a thin and light barrel, which is of equal thickness in every part of its circumference, is much less liable to burst than one which is considerably thicker and heavier, but which, from being badly filed or bored, is of unequal strength in different places.

It is also of importance to determine of what length the barrel ought to be, in order to acquire that range which the sportsman has occasion for. On this subject we have received the following information from an experienced sportsman. We have, at different times, compared barrels of all the intermediate lengths between 28 and 40 inches, and of nearly the same caliber, that is to say, from 22 to 26; and these trials were made both by firing the pieces from the shoulder, and from a firm block, at an equal distance, and with equal weights of the same powder and of the same shot.

To avoid every possibility of error, the quires of paper at which we fired were fixed against planks instead of being placed against the wall. From these trials frequently repeated, we found that the shot pierced an equal number of sheets, whether it was fired from a barrel of 28, 30, 32, 34, 36, 38, or 40, inches in length. Nay more, we have compared two barrels of the same caliber, but one of them 33, and the other 66 inches long, by repeatedly firing them in the same manner as the others, at different distances, from 45 to 100 paces, and the results have always been the same, i. e. the barrel of 33 inches drove its shot through as many sheets of paper as that of 66 did. The conclusion from all this is, that the difference of 10 inches in the length of the barrel, which seems to be more than is ever insisted upon among sportsmen, produces no sensible difference in the range of the piece; and therefore, that every one may please himself in the length of his barrel, without either detriment or advantage to the range.

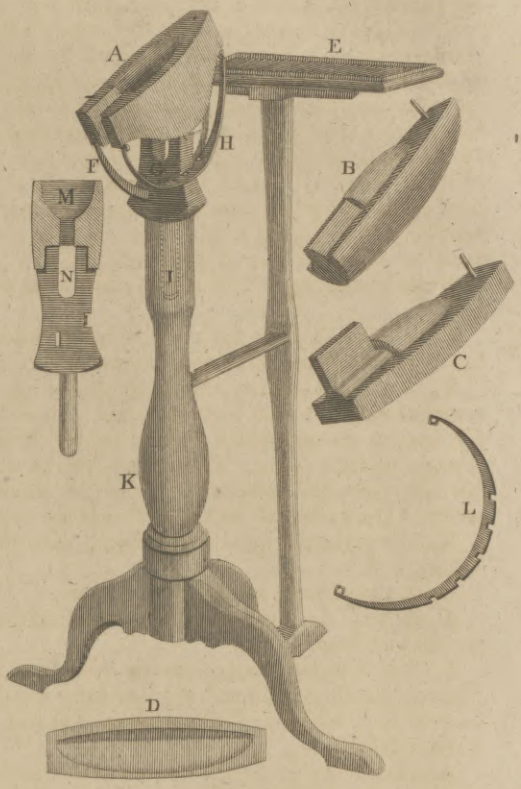
It may appear as an objection to this, that a duck-gun which is five or six feet long kills at a greater distance than

Shoemakers MACHINE. Plate CCCCXCVI.

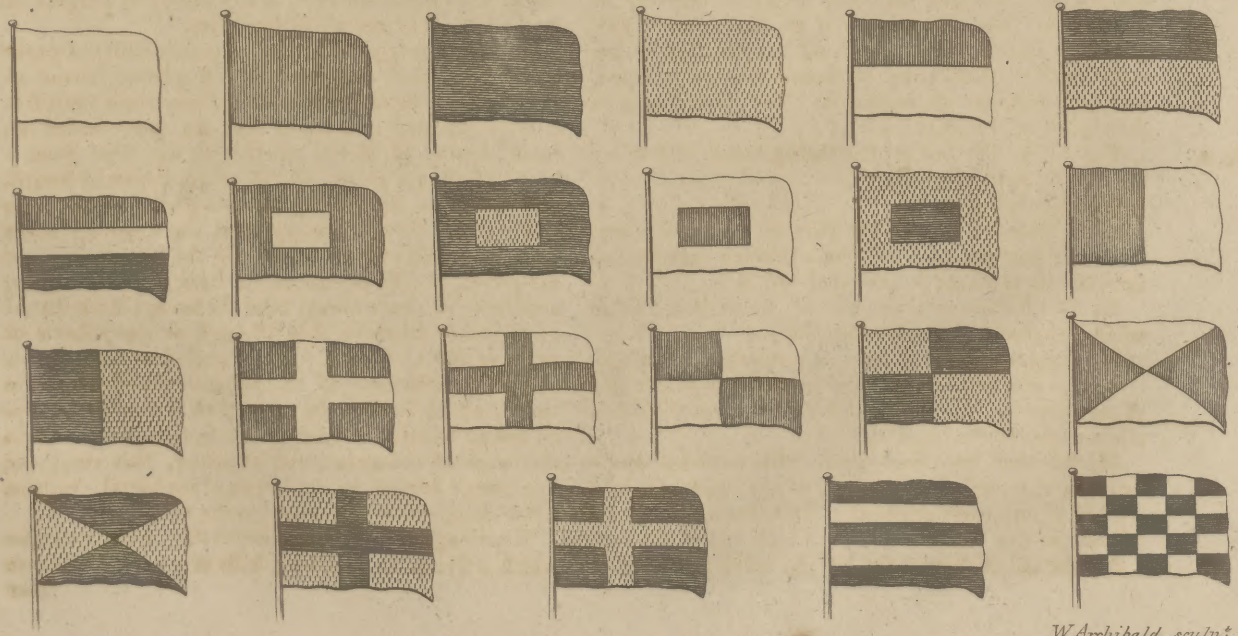
Fig. 1.



Fig. 2.



Naval SIGNALS.



W. Archibald sculpt.

Shoot'ng.

than a fowling-piece; but this is not owing to its length, but to its greater weight and thickneſs, which give it ſuch additional ſtrength, that the ſhot may be increaſed, and the charge of powder doubled, trebled, and even quadrupled. But a barrel of five or ſix feet length would be very inconvenient for fowling. Thoſe who conſult the appearance of the piece, lightneſs, and the eaſe with which it is managed, will find that a barrel from 32 to 38 inches will anſwer beſt.

3 Proper length of the barrel

4 Caliber.

The next thing to be conſidered is, of what dimenſions the caliber or bore of a fowling-piece ought to be. This matter has been ſubjected to experiment, and it has been found, that a barrel of 22 or 24, which is the largeſt caliber uſually employed in fowling-pieces, throws its ſhot as cloſely as one of the ſmalleſt caliber, viz. of 30 or 32 (A).

5 Length and form of the ſtock.

As to the length and form of the ſtock, it may be laid down as a principle, that a long ſtock is preferable to a ſhort one, and at the ſame time rather more bent than uſual; for a long ſtock ſits firmer to the ſhoulder than a ſhort one, and particularly ſo when the ſhooter is accuſtomed to place his left hand, which principally ſupports the piece, near to the entrance of the ramrod into the ſtock.

It is certain, however, that the ſtock may be ſo formed as to be better ſuited to one man than another. For a tall, long-armed man, the ſtock of a gun ſhould be longer than for one of a leſs ſtature and ſhorter arm. That a ſtraight ſtock is proper for him who has high ſhoulders and a ſhort neck; for, if it be much bent, it would be very difficult for him, eſpecially in the quick motion required in ſhooting at a flying or running object, to place the butt of the gun-ſtock firmly to the ſhoulder, the upper part alone would in general be fixed; which would not only raiſe the muzzle, and conſequently ſhoot high, but make the recoil much more ſenſibly felt, than if the whole end of the ſtock were firmly placed on his ſhoulder. Beſides, ſuppoſing the ſhooter to bring the butt home to his ſhoulder, he would ſcarcely be able to level his piece at the object. On the contrary, a man with low ſhoulders, and a long neck, requires a ſtock much bent; for if it is ſtraight, he will, in the act of lowering his head to that place of the ſtock at which his cheek ſhould reſt in taking aim, feel a conſtraint which he never experiences, when by the effect of the proper degree of bent, the ſtock lends him ſome aſſiſtance, and, as it were, meets his aim half way.

Having now deſcribed the fowling-piece which has been found to anſwer beſt, it will next be proper to give ſome inſtructions for the choice of gunpowder, ſhot, and wadding.

6 Beſt gunpowder.

The various kinds of gunpowder are well known; but, in the opinion of ſome experienced ſportſmen, Hervey's battle-powder is the beſt. Thoſe who wiſh to examine the ſtrength of powder, may determine it by drying ſome of it very well, and then trying how many ſheets of paper it will drive the ſhot through, at the diſtance of 10 or 12 yards. In this trial we ſhould be careful to employ the ſame ſized ſhot in each experiment, the quantity both of the ſhot and the powder being regulated by exact weight; otherwiſe we cannot, even in this experiment, arrive at any certainty in comparing the ſtrength of different powders, or of the ſame powder at different times. Shooting.

7 To be kept dry.

Powder ought to be kept very dry, for every degree of moiſture injures it; and if conſiderable, the ſaltpetre is diſſolved, and the intimate combination of the ſeveral ingredients is entirely deſtroyed. It is obſerved, that after firing with damp powder the piece becomes very foul, which ſeems to ariſe from the diminution of the activity of the fire in the exploſion. Flaſks of copper or tin are much better for keeping powder in than thoſe made of leather, or than ſmall caſks. Their necks ought to be ſmall and well ſtopped with cork.

8 Size of ſhot.

The *patent milled ſhot* is now very generally uſed, and is reckoned ſuperior to any other. The ſize of the ſhot muſt vary according to the particular ſpecies of game which is the object of the ſportſman's purſuit, as well as be adapted to the ſeaſon. In the firſt month of partridge ſhooting, N° 1. is moſt proper; for ſince at this time the birds ſpring near at hand, and we ſeldom fire at more than the diſtance of 40 paces, if the ſhooter takes his aim but tolerably well, it is almoſt impoſſible for a bird at this diſtance to eſcape in the circle which the ſhot forms.

As hares ſit cloſer, and are thinly covered with fur at this ſeaſon, they may eaſily be killed with this ſhot at 30 or 35 paces. N° 1. is equally proper for ſhooting ſnipes or quails. About the beginning of October, when the partridges are ſtronger, N° 3. is the moſt proper ſhot to be uſed. Many ſportſmen uſe no other during the whole ſeaſon. The directions which have now been given refer only to the patent ſhot.

We ſhall now ſubjoin a table, which will ſhew at one view the number of pellets compoſing an ounce weight of each ſort of ſhot, the patent and the common, beginning with the ſmalleſt ſize.

PATENT SHOT.

N° 8.	1 ounce	- -	620
7	id.	- - -	480
× (B)	id.	- -	300
1	ib	- -	220
2	id.	- -	180
3	id.	- -	157
4	id.	-	105
5	id.		83

COMMON SHOT.

N° 7.	1 ounce	- - -	350
6	id.	- -	260
5	id.	- -	235
4	id.	- -	190
3	id.	- -	140
2	id.	- - -	110
1	id.	- - -	95

9 Proportion of powder and ſhot in the charge.

For a fowling-piece of a common caliber, which is from 24 to 30 balls to the pound weight, a dram and a quarter,

(A) In ſpeaking of the ſize of the caliber, we mean by 22 or 24, that ſo many balls exactly fitting it weigh juſt one pound; and every caliber is marked in the ſame way.

(B) The reader will obſerve that the patent ſhot has no N° 6, the × being ſubſtituted in its place, and that the numbers do not follow each other in the order of progreſſion: The reaſon of this we cannot aſſign.

Shooting. quarter, or at moſt a dram and a half, of good powder; and an ounce, or an ounce and a quarter of ſhot, is ſufficient. But when ſhot of a larger ſize is uſed, ſuch as N° 5. the charge of ſhot may be increaſed one-fourth, for the purpoſe of counterbalancing in ſome degree what the ſize of the ſhot loſes in the number of pellets, and alſo to enable it to garniſh the more. For this purpoſe the ſportſman will find a meaſure marked with the proper gauges very convenient to him. An inſtrument of this nature has been made by an ingenious artiſt of London, Egg, of the Haymarket.

A conſequence of overloading with ſhot, is the powder has not ſufficient ſtrength to throw it to its proper diſtance; for if the object fired at be diſtant, one-half of the pellets compoſing the charge, by their too great quantity and weight, will ſtrike againſt each other, and fall by the way; and thoſe which reach the mark will have ſmall force, and will produce but little or no effect.

10 Wadding. The uſe of the *wadding* is to carry the ſhot in a body to a certain diſtance from the muzzle of the piece. It ought to be of ſoft and pliable materials. The beſt kind of wadding, in the opinion of an experienced fowler, is a piece of an old hat; but this cannot be obtained in ſufficient quantity. Next to it nothing is better than ſoft brown paper, which combines ſuppleneſs with conſiſtence, moulds itſelf to the barrel, and never falls to the ground within 12 or 15 paces from the muzzle of the piece. Tow anſwers very well, and cork has been extolled for poſſeſſing the peculiar virtue of increaſing the range and cloſeneſs of the ſhot.

The wadding ought to be quite cloſe in the barrel, but not rammed too hard; for if it be rammed too cloſe, or be of a rigid ſubſtance, the piece will recoil, and the ſhot will ſpread too much. On the other hand, if the wadding be very looſe, or is compoſed of too ſoft materials, ſuch as wool or cotton, the diſcharge will not poſſeſs proper force.

11 Powder and ſhot to be ſlightly rammed down. In loading a piece, the powder ought to be ſlightly rammed down by only preſſing the ramrod two or three times on the wadding, and not by drawing up the ramrod and then returning it into the barrel with a jerk of the arm ſeveral times. For when the powder is violently compreſſed, ſome of the grains muſt be bruiſed, which will prevent the exploſion from being quick, and will ſpread the ſhot too wide. In pouring the powder into the barrel, the meaſure ought to be held ſo as that the powder may fall moſt readily to the bottom. That no grains may adhere to the ſides of the barrel, the butt-end of the piece may be ſtruck againſt the ground. The ſhot ought never to be rammed down with force: it is ſufficient to ſtrike the butt-end of the gun againſt the ground as before. Then the wadding is to be put down gently. A ſportſman ought never to carry his gun under his arm with the muzzle inclined downwards, for this practice looſens the wadding and charge too much.

12 Directions for loading and firing. Immediately after the piece is fired it ought to be reloaded; for while the barrel is ſtill warm, there is no danger of any moiſture lodging in it to hinder the powder from falling to the bottom. As it is found that the coldneſs of the barrel, and perhaps the moiſture condenſed in it, diminiſhes the force of the powder in the firſt ſhot; it is proper to fire off a little powder before the piece is loaded. Some prime before loading, but this is not proper unleſs the touch-hole be very large. After every diſcharge the touch-hole ought to be pricked, or a ſmall feather may be inſerted to clear away any humidity or foulneſs that has been contracted. Shooting.

The ſportſman having loaded his piece, muſt next prepare to fire. For this purpoſe he ought to place his hand near the entrance of the ramrod, and at the ſame time graſp the barrel firmly. The muzzle ſhould be a little elevated, for it is more uſual to ſhoot low than high. This direction ought particularly to be attended to when the object is a little diſtant; becauſe ſhot as well as ball only moves a certain diſtance point blank, when it begins to deſcribe the curve of the parabola.

13 Diſtance which the ſportſman ought to kill. Practice ſoon teaches the ſportſman the proper diſtance at which he ſhould ſhoot. The diſtance at which he ought infallibly to kill any kind of game with patent ſhot, N° 3. provided the aim be well taken, is from 25 to 35 paces for the footed, and from 40 to 45 paces for the winged, game. Beyond this diſtance even to 50 or 55 paces, both partridges and hares are ſometimes killed; but in general the hares are only ſlightly wounded, and carry away the ſhot; and the partridges at that diſtance preſent ſo ſmall a ſurface, that they frequently eſcape untouched between the ſpaces of the circle. Yet it does not follow that a partridge may not be killed with N° 3. patent ſhot at 60 and even 70 paces diſtance, but then theſe ſhots are very rare.

14 How the aim is to be taken. In ſhooting at a bird flying, or a hare running acroſs, it is neceſſary to take aim before the object in proportion to its diſtance at the time of firing. If a partridge flies acroſs at the diſtance of 30 or 35 paces, it will be ſufficient to aim at the head, or at moſt but a ſmall ſpace before it. If it be 50, 60, or 70 paces diſtant, it is then requiſite to aim at leaſt half a foot before the head. The ſame practice ought to be obſerved in ſhooting at a hare, rabbit, or fox, when running in a croſs direction; at the ſame time making due allowance for the diſtance and ſwiftneſs of the pace. Another thing to be attended to is, that the ſhooter ought not involuntarily to ſtop the motion of the arms at the moment of pulling the trigger; for the inſtant the hand ſtops in order to fire, however inconſiderable the time be, the bird gets beyond the line of aim, and the ſhot will miſs it. A ſportſman ought therefore to accuſtom his hand while he is taking aim to follow the object. When a hare runs in a ſtraight line from the ſhooter, he ſhould take his aim between the ears, otherwiſe he will run the hazard either of miſſing, or at leaſt not of killing dead, or as it is ſometimes called *clean*.

15 Every part of the piece to be kept clean and dry. A fowling-piece ſhould not be fired more than 20 or 25 times without being waſhed; a barrel when foul neither ſhoots ſo ready, nor carries the ſhot ſo far as when clean. The flint, pan, and hammer, ſhould be well wiped after each ſhot; this contributes greatly to make the piece go off quick, but then it ſhould be done with ſuch expedition, that the barrel may be reloaded whilſt warm, for the reaſons we have before advanced. The flint ſhould be frequently changed, without waiting until it miſſes fire, before a new one is put in. Fifteen or eighteen ſhots, therefore, ſhould only be fired with the ſame flint; the expence is too trifling to be regarded, and by changing it thus often much vexation will be prevented.

Shooting.

A gun alſo ſhould never be fired with the prime of the preceding day; it may happen that an old priming will ſometimes go off well, but it will more frequently contract moiſture and fuze in the firing; then the object will moſt probably be miſſed, and that becauſe the piece was not freſh primed.

16 When and how game is to be ſought for.

For the information of the young ſportſman we ſhall add a few more general directions. In warm weather he ought to ſeek for game in plains and open grounds, and in cold weather he may ſearch little hills expoſed to the ſun, along hedges, among heath, in ſtubbles, and in paſtures where there is much furze and fern. The morning is the beſt time of the day, before the dew is exhaled, and before the game has been diſturbed. The colour of the ſhooters dreſs ought to be the ſame with that of the fields and trees; in ſummer it ought to be green, in winter a dark gray. He ought to hunt as much as poſſible with the wind, not only to prevent the game from perceiving the approach of him and his dog, but alſo to enable the dog to ſcent the game at a greater diſtance.

He ſhould never be diſcouraged from hunting and ranging the ſame ground over and over again, eſpecially in places covered with heath, brambles, high graſs, or young coppice wood. A hare or rabbit will frequently ſuffer him to paſs ſeveral times within a few yards of its form without getting up. He ſhould be ſtill more patient when he has marked partridges into ſuch places, for it often happens, that after the birds have been ſprung many times, they lie ſo dead that they will ſuffer him almoſt to tread upon them before they will riſe. Pheaſants, quails, and woodcocks do the ſame.

He ought to look carefully about him, never paſſing a buſh or tuft of graſs without examination; but he ought never to ſtrike them with the muzzle of his gun for it will looſen his wadding. He who patiently beats and ranges his ground over again, without being diſcouraged, will always kill the greateſt quantity of game; and if he is ſhooting in company, he will find game where others have paſſed without diſcovering any.

When he has fired he ſhould call in his dog, that he may not have the mortification to ſee game riſe which he cannot ſhoot. When he has killed a bird, inſtead of being anxious about picking it up, he ought to follow the reſt of the covey with his eye till he ſee them ſettle.

17 Dogs fit for ſport.

Three ſpecies of dogs are capable of receiving the proper inſtruction, and of being trained. Theſe are the ſmooth pointer, the ſpaniel, and the rough pointer. The laſt is a dog with long curled hair, and ſeems to be a mixed breed of the water-dog and the ſpaniel. The ſmooth pointer is active and lively enough in his range, but in general is proper only for an open country.

The greateſt part of theſe dogs are afraid of water, brambles, and thickets; but the ſpaniel and the rough pointer are eaſily taught to take the water, even in cold weather, and to range the woods and rough places as well as the plain. Greater dependence may therefore be had on theſe two laſt ſpecies of dogs than on the ſmooth pointer.

18 Directions for training a pointer,

The education of a pointer may commence when he is only five or ſix months old. The only leſſons which he can be taught at this time are to *fetch* and *carry* any thing when deſired; to come in when he runs far off, and to go behind when he returns; uſing, in the one caſe, the words *here*, *come in*, and in the other *back* or *behind*. It is alſo neceſſary at this period to accuſtom him to be tied up in the kennel or ſtable; but he ought not at firſt to be tied too long. He ſhould be let looſe in the morning, and faſtened again in the evening. When a dog is not early accuſtomed to be chained, he diſturbs every perſon in the neighbourhood by howling. It is alſo of importance that the perſon who is to train him ſhould give him his food.

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When the dog has attained the age of 10 or 12 months, he may be carried into the field to be regularly trained. At firſt he may be allowed to follow his own inclination, and to run after every animal he ſees. His indiſcriminating eagerneſs will ſoon abate, and he will purſue only partridges and hares. He will ſoon become tired of following partridges in vain, and will content himſelf after having flushed them to follow them with his eyes. It will be more difficult to prevent him from following hares.

All young dogs are apt to *rake;* that is, to hunt with their noſes cloſe to the ground, to follow birds rather by the track than by the wind. But partridges lie much better to dogs that *wind* them, than to thoſe that follow them by the track. The dog that winds the ſcent approaches the birds by degrees and without diſturbing them; but they are immediately alarmed when they ſee a dog tracing their footſteps. When you perceive that your dog is committing this fault, call to him in an angry tone *hold up:* he will then grow uneaſy and agitated, going firſt to the one ſide and then to the other, until the wind brings him the ſcent of the birds. After finding the *game* four or five times in this way, he will take the wind of himſelf, and hunt with his noſe high. If it be difficult to correct this fault, it will be neceſſary to put the *puzzle peg* upon him. This is of very ſimple conſtruction, conſiſting only of a piece of oak or deal inch board, one foot in length, and an inch and a half in breadth, tapering a little to one end; at the broader end are two holes running longitudinally through which the collar of the dog is put, and the whole is buckled round his neck; the piece of wood being projected beyond his noſe, is then faſtened with a piece of leather thong to his under jaw. By this means the peg advancing ſeven or eight inches beyond his ſnout, the dog is prevented from putting his noſe to the ground and raking.

As ſoon as the young dog knows his game, you muſt bring him under complete ſubjection. If he is tractable, this will be eaſy; but if he is ſtubborn, it will be neceſſary to uſe the *traſh cord*, which is a rope or cord of 20 or 25 fathoms in length faſtened to his collar. If he refuſe to come back when called upon, you muſt check him ſmartly with the cord, which will often bring him upon his haunches. But be ſure you never call to him except when you are within reach of the cord. After repeating this ſeveral times he will not fail to come back when called; he ought then to be careſſed, and a bit of bread ſhould be given him. He ought now conſtantly to be tied up, and never unchained, except when you give him his food, and even then only when he has done ſomething to deſerve it.

The next ſtep will be to throw down a piece of bread on the ground, at the ſame moment taking hold of

Shooting. of the dog by the collar, calling out to him, "take heed,—ſoftly." After having held him in this manner for ſome ſpace of time, ſay to him, "ſeize—lay hold." If he is impatient to lay hold of the piece of bread before the ſignal is given, correct him gently with a ſmall whip. Repeat this leſſon until he "takes heed" well, and no longer requires to be held faſt to prevent him from laying hold of the bread. When he is well accuſtomed to this manége, turn the bread with a ſtick, holding it in the manner you do a fowling-piece, and having done ſo, cry *ſeize*. Never ſuffer the dog to eat either in the houſe or field without having firſt made him take heed in this manner.

Then, in order to apply this leſſon to the game, fry ſmall pieces of bread in hogs lard, with the dung of partridge; take theſe in a linen bag into the fields, ſtubbles, ploughed grounds, and paſtures, and there put the pieces in ſeveral different places, marking the ſpots with little cleft pickets of wood, which will be rendered more diſtinguiſhable by putting pieces of card in the nicks. This being done, caſt off the dog and conduct him to theſe places, always hunting in the wind. After he has caught the ſcent of the bread, if he approaches too near, and ſeems eager to fall upon it, cry to him in a menacing tone, "take heed;" and if he does not ſtop immediately, correct him with the whip. He will ſoon comprehend what is required of him, and will ſtand.

At the next leſſon, take your gun charged only with powder, walk gently round the piece of bread once or twice, and fire inſtead of crying *ſeize*. The next time of practiſing this leſſon, walk round the bread four or five times, but in a greater circle than before, and continue to do this, until the dog is conquered of his impatience, and will ſtand without moving until the ſignal is given him. When he keeps his point well, and ſtands ſteady in this leſſon, you may carry him to the birds; if he run in upon them, or bark when they ſpring up, you muſt correct him; and if he continue to do ſo, you muſt return to the fried bread; but this is ſeldom neceſſary.

When the dog has learned by this uſe of the bread to take heed, he may be carried to the fields with the traſh-cord dragging on the ground. When he ſprings birds for the firſt time, if he runs after them or barks, check him by calling out to him, *take heed*. If he point properly, careſs him; but you ought never to hunt without the cord until he point ſtaunch.

19 and preventing his running after ſheep.

If the dog runs after ſheep, and it be difficult to cure him, couple him with a ram, and then whip the dog as long as you can follow him. His cries will at firſt alarm the ram; he will run with all his ſpeed, and drag the dog along with him; but he will at length take courage, turn upon the dog, and butt him ſeverely with his horns. When you think the dog is ſufficiently chaſtiſed, untie him: he will never run at ſheep again.

Having now given a few general inſtructions concerning the beſt method of training pointers, we ſhall ſubjoin a few obſervations reſpecting the moſt common ſpecies of game, the partridge, pheaſant, grouſe, woodcock, ſnipe, and wild duck.

20 Obſervations concerning the partridge.

Partridges pair in the ſpring, and lay their eggs (generally from 15 to 20) during May and part of June. The young begin to fly about the end of June, and their plumage is complete in the beginning of October. The male has a conſpicuous horſe ſhoe upon his breaſt, an obtuſe ſpur on the hinder part of the leg, which diſtinguiſh him from the female. He is alſo rather larger. Shooting.

When a ſportſman is ſhooting in a country where the birds are thin, and he no longer chooſes to range the field for the bare chance of meeting with them, the following method will ſhow him where to find them on another day. In the evening, from ſunſet to nightfall, he ſhould poſt himſelf in a field, at the foot of a tree or a buſh, and there wait until the partridges begin to call or juck, which they always do at that time; not only for the purpoſe of drawing together when ſeparated, but alſo when the birds compoſing the covey are not diſperſed. After calling in this manner for ſome little ſpace of time, the partridges will take to flight; then, if he mark the place where they alight, he may be aſſured they will lie there the whole night, unleſs diſturbed. Let him return to the ſame poſt the next morning by break of day, and there watch a while; being careful to keep his dog in a ſtring, if he is not under perfect command.

As ſoon as the dawn begins to peep, the partridges will begin to call, and ſoon afterwards will perform the ſame manœuvre as on the preceding evening; that is, after having called a while, they will take their flight, and will moſt commonly ſettle at a little diſtance. There in a few minutes they will call again, and ſometimes take a ſecond flight, but that will be to no great diſtance. Then as ſoon as the ſun is riſen, and the ſportſman can ſee to ſhoot, he may caſt off his dog and purſue them.

21 Pheaſant. The *pheaſant* is of the ſize of a common dunghill cock, and lays its eggs generally in the woods, the number of which is 10 or 12.

Pheaſants are accounted ſtupid birds; for when they are ſurpriſed they will frequently ſquat down like a rabbit, ſuppoſing themſelves to be in ſafety as ſoon as their heads are concealed; and in this way they will ſometimes ſuffer themſelves to be killed with a ſtick. They love low and moiſt places, and haunt the edges of thoſe pools which are in found in woods, as well as the high graſs of marſhes that are near at hand; and above all, places where there are clumps of alders.

22 Grouſe. *Grouſe*, or moor-game, are found in Wales, in the northern counties of England, and in great abundance in Scotland. They chiefly inhabit thoſe mountains and moors which are covered with heath, and ſeldom deſcend to the low grounds. They fly in companies of four or five braces, and love to frequent moſſy places, particularly in the middle of the day or when the weather is warm. In purſuing this game, when the pointer ſets, and the ſportſman perceives the birds running with their heads erect, he muſt run after them as faſt as he can, in the hope that he may get near enough to ſhoot when they riſe upon the wing; for he may be pretty certain they will not lie well that day. As theſe birds are apt to grow ſoon putrid, they ought to be drawn carefully the inſtant they are ſhot and ſtuffed with any heath, and if the feathers happen to be wetted they muſt be wiped dry.

23 Woodcock. The *woodcock* is a bird of paſſage; it commonly arrives about the end of October, and remains until the middle of March. Woodcocks are fatteſt in December and January, but from the end of February they are lean. At their arrival they drop anywhere, but afterwards

Shooting. wards take up their reſidence in copſes of nine or ten years growth. They ſeldom, however, ſtay in one place longer than 12 or 15 days. During the day, they remain in thoſe parts of the woods where there are void ſpaces or glades, picking up earth-worms and grubs from the fallen leaves. In the evening they go to drink and waſh their bills at pools and ſprings, after which they repair to the open fields and meadows for the night. It is remarkable, that when a woodcock ſprings from a wood to go into the open country, he always endeavours to find ſome glade or opening, which he follows to the boundaries of the wood. At his return he purſues the ſame path a good way, and then turns to the right or left oppoſite to ſome glade, in order to drop into a thick part of the wood, where he may be ſheltered from the wind. He may therefore be watched with advantage in theſe narrow paſſes and little alleys on the edges of woods which lead to a pool or ſpring, or he may be watched in the duſk of the evening near the pools which he frequents.

24 Snipe. The *ſnipe* is a bird of paſſage as well as the woodcock. This bird is ſcarcely worth ſhooting till the froſt commences. In the month of November they begin to grow fat. Snipes, like woodcocks, frequent ſprings, bogs, and marſhy places, and generally fly againſt the wind. The ſlant and croſs ſhots are rather difficult, as the birds are ſmall and fly very quickly. The ſportſman ought to look for them in the direction of the wind; becauſe then they will fly towards him, and preſent a fairer mark.

25 Wild duck. The *wild duck* is alſo a bird of paſſage, and arrives here in great flocks from the northern countries in the beginning of winter. Still, however, a great many remain in our marſhes and fens during the whole year, and breed.

The wild duck differs little in plumage from the tame duck, but is eaſily diſtinguiſhed by its ſize, which is leſs; by the neck, which is more ſlender; by the foot, which is ſmaller; by the nails, which are more black; and above all, by the web of the foot, which is much finer and ſofter to the touch.

In the ſummer ſeaſon, when it is known that a team of young ducks are in a particular piece of water, and juſt beginning to fly, the ſportſman is ſure to find them early in the morning dabbling at the edges of the pool, and amongſt the long graſs, and then he may get very near to them: it is uſual alſo to find them in thoſe places at noon.

In the beginning of autumn almoſt every pool is frequented by teams of wild ducks, which remain there during the day, concealed in the ruſhes. If theſe pools are of ſmall extent, two ſhooters, by going one on each ſide, making a noiſe and throwing ſtones into the ruſhes, will make them fly up; and they will in this way frequently get ſhots, eſpecially if the pool is not broad, and contracts at one end. But the ſureſt and moſt ſucceſsful way, is to launch a ſmall boat or trow on the pool, and to traverſe the ruſhes by the openings which are found; at the ſame time making as little noiſe as poſſible. In this manner the ducks will ſuffer the ſportſmen to come ſufficiently near them to ſhoot flying; and it often happens that the ducks, after having flown up, only make a circuit, return in a little time, and again alight upon the pool. Then the ſportſmen endeavour a ſecond time to come near them. If ſeveral ſhooters are in company, they ſhould divide; two ſhould go in the boat, whilſt the others ſpread themſelves about the edge of the pool, in order to ſhoot the ducks in their flight. In pools which will not admit a trow, water-ſpaniels are abſolutely neceſſary for this ſport. Shooting || Shore.

In winter they may be found on the margins of little pools; and when pools and rivers are frozen up, they muſt be watched for in places where there are ſprings and waters which do not freeze. The ſport is then much more certain, becauſe the ducks are confined to theſe places in order to procure aquatic herbs, which are almoſt their only food at this period.

SHOP-LIFTERS, are thoſe that ſteal goods privately out of ſhops; which, being to the value of 5s. though no perſon be in the ſhop, is felony without the benefit of clergy by the 10 and 11 W. III. c. 23.

SHORE, a place waſhed by the ſea, or by ſome large river.

Count Marſigli divides the ſea-ſhore into three portions: the firſt of which is that tract of land which the ſea juſt reaches in ſtorms and high tides, but which it never covers; the ſecond part of the ſhore is that which is covered in high tides and ſtorms, but is dry at other times; and the third is the deſcent from this, which is always covered with water.

The firſt part is only a continuation of the continent, and ſuffers no alteration from the neighbourhood of the ſea, except that it is rendered fit for the growth of ſome plants, and wholly unfit for that of others, by the ſaline ſteams and impregnations: and it is ſcarce to be conceived by any, but thoſe who have obſerved it, how far on land the effects of the ſea reach, ſo as to make the earth proper for plants which will not grow without this influence; there being ſeveral plants frequently found on high hills and dry places, at three, four, and more miles from the ſea, which yet would not grow unleſs in the neighbourhood of it, nor will ever be found elſewhere.

The ſecond part or portion of the ſhore is much more affected by the ſea than the former, being frequently waſhed and beaten by it. Its productions are rendered ſalt by the water, and it is covered with ſand, or with the fragments of ſhells in form of ſand, and in ſome places with a tartarous matter depoſited from the water; the colour of this whole extent of ground is uſually duſky and dull, eſpecially where there are rocks and ſtones, and theſe covered with a ſlimy matter.

The third part of the ſhore is more affected by the ſea than either of the others; and is covered with an uniform cruſt of the true nature of the bottom of the ſea, except that plants and animals have their reſidence in it, and the decayed parts of theſe alter it a little.

SHORE, *Jane*, the celebrated concubine of the licentious King Edward IV. was the wife of Mr Matthew Shore, a goldſmith in Lombard-ſtreet, London. Kings are ſeldom unſucceſsful in their amorous purſuits; therefore there was nothing wonderful in Mrs Shore's removing from Lombard-ſtreet to ſhine at court as the royal favourite. Hiſtorians repreſent her as extremely beautiful, remarkably cheerful, and of moſt uncommon generoſity. The king, it is ſaid, was no leſs captivated with her temper than with her perſon: ſhe never made uſe of her influence over him to the prejudice of any perſon; and if ever ſhe importuned him, it was in favour of the unfortunate. After the death of Edward,

Shore || Short.

ſhe attached herſelf to the lord Haſtings; and when Richard III. cut off that nobleman as an obſtacle to his ambitious ſchemes, Jane Shore was arreſted as an accomplice, on the ridiculous accuſation of witchcraft. This, however, terminated only in a public penance; excepting that Richard rifled her of all her little property: but whatever ſeverity might have been exerciſed towards her, it appears that ſhe was alive, though ſufficiently wretched, under the reign of Henry VIII. when Sir Thomas More ſaw her poor, old, and ſhrivelled, without the leaſt trace of her former beauty. Mr Rowe, in his tragedy of Jane Shore, has adopted the popular ſtory related in the old hiſtorical ballad, of her periſhing by hunger in a ditch where Shoreditch now ſtands. But Stow aſſures us that ſtreet was ſo named before her time.

SHORL. See SCHORL, MINERALOGY *Index*.

SHORLING and MORLING, are words to diſtinguiſh fells of ſheep; *ſhorling* being the fells after the fleeces are ſhorn off the ſheep's back; and *morling*, the fells ſtead off after they die or are killed. In ſome parts of England they underſtand by a *ſhorling*, a ſheep whoſe face is ſhorn off; and by a *morling*, a ſheep that dies.

SHORT, JAMES, an eminent optician, was born in Edinburgh on the 10th of June, O. S. in the year 1710. At ten years of age, having loſt his father and mother, and being left in a ſtate of indigence, he was received into Heriot's Hoſpital, (ſee *EDINBURGH, Public Buildings*, N° 16.), where he ſoon diſplayed his mechanical genius in conſtructing, for himſelf, little cheſts, bookcaſes, and other conveniences, with ſuch tools as fell in his way. At the age of twelve he was removed from the Hoſpital to the High School, where he ſhowed a conſiderable taſte for claſſical literature, and generally kept at the head of his forms. In the year 1726 he was entered into the univerſity, where he paſſed through the uſual courſe of education, and took his maſter's degree with great applauſe.

By his friends he was intended for the church; but after attending a courſe of theological lectures, his mind revolted from a profeſſion which he thought little ſuited to his talents; and he devoted his whole time to mathematical and mechanical purſuits. He had been fortunate enough to have the celebrated M'Laurin for his preceptor; who having ſoon diſcovered the bent of his genius, and made a proper eſtimate of the extent of his capacity, encouraged him to proſecute thoſe ſtudies in which nature had qualified him to make the greateſt figure. Under the eye of that eminent maſter, he began in 1732 to conſtruct Gregorian teleſcopes; and, as the profeſſor obſerved in a letter to Dr Jurin, "by taking care of the figure of his ſpecula, he was enabled to give them larger apertures, and to carry them to greater perfection, than had ever been done before him." (See OPTICS, N° 89.).

In the year 1736 Mr Short was called to London, at the deſire of Queen Caroline, to give inſtructions in mathematics to William duke of Cumberland; and immediately on his appointment to that very honourable office he was elected a fellow of the royal ſociety, and patronized by the earls of Morton and Macclesfield. In the year 1739 he accompanied the former of thoſe noble lords to the Orkney iſles, where he was employed in adjuſting the geography of that part of Scotland: and happy it was for him that he was ſo employed, as he might otherwiſe have been involved in a ſcuffle which took place between the retainers of Sir James Stewart of Barra and the attendants of the earl, in which ſome of the latter were dangerouſly wounded.

Short || Shortford.

Mr Short having returned to London, and finally eſtabliſhed himſelf there in the line of his profeſſion, was in 1742 employed by Lord Thomas Spencer to make for him a reflector of twelve feet focus, for which he received 600 guineas. He made ſeveral other teleſcopes of the ſame focal diſtance with greater improvements and higher magnifiers; and in 1752 finiſhed one for the king of Spain, for which, with its whole apparatus, he received 1200l. This was the nobleſt inſtrument of the kind that had then been conſtructed, and perhaps it has never yet been ſurpaſſed except by the aſtoniſhing reflectors of Herſchel. See TELESCOPE.

Mr Short uſed to viſit the place of his nativity once every two or three years during his reſidence in London, and in 1766 he viſited it for the laſt time. On the 15th of June 1768 he died, after a very ſhort illneſs, at Newington Butts, near London, of a mortification in his bowels, and was buried on the 22d of the ſame month, having completed, within a few days, his fifty-eighth year. He left a fortune of about 20,000l. of which 15,000l. was bequeathed to two nephews, and the reſt in legacies to his friends. In gratitude for the ſteady patronage of the earl of Morton, he left to his daughter the lady Mary Douglas, afterwards counteſs of Aboyne, 1000l. and the reverſion of his fortune, ſhould his nephews die without iſſue; but this reverſionary legacy the lady, at the deſire of her father, generouſly relinquiſhed by a deed in favour of Mr Short's brother Mr Thomas Short and his children. Mr Short's eminence as an artiſt is univerſally known, and we have often heard him ſpoken of by thoſe who were acquainted with him from his youth, as a man of virtue and of very amiable manners.

SHORT-Hand Writing. See STENOGRAPHY.

SHORT-Jointed, in the *Manege*. A horſe is ſaid to be ſhort-jointed that has a ſhort paſtern; when this joint, or the paſtern is too ſhort, the horſe is ſubject to have his fore-legs from the knee to the cornet all in a ſtraight line. Commonly your ſhort-jointed horſes do not manege ſo well as the long-jointed; but out of the manege the ſhort-jointed are the beſt for travel or fatigue.

SHORT-Sightedneſs, a certain defect in viſion, by which objects cannot be diſtinctly ſeen unleſs they are very near the eye. See OPTICS, N° 142.

SHORTFORD, q. d. *fore-cloſe*, an ancient cuſtom in the city of Exeter, when the lord of the fee cannot be anſwered rent due to him out of his tenement, and no diſtreſs can be levied for the ſame. The lord is then to come to the tenement, and there take a ſtone, or ſome other dead thing off the tenement, and bring it before the mayor and bailiff, and thus he muſt do ſeven quarter days ſucceſſively; and if on the ſeventh quarter-day the lord is not ſatisfied of his rent and arrears, then the tenement ſhall be adjudged to the lord to hold the ſame a year and a day; and forthwith proclamation is to be made in the court, that if any man claims any title to the ſaid tenement, he muſt appear within the year and day next following, and ſatisfy the lord of the ſaid rent and arrears: but if no appearance be made, and the rent not paid, the lord comes again to the court,

Shot. court, and prays that, according to the cuſtom, the ſaid tenement be adjudged to him in his demeſne as of fee, which is done accordingly, ſo that the lord hath from thenceforth the ſaid tenement, with the appurtenances to him and his heirs.

SHOT, a denomination given to all ſorts of balls for fire-arms: thoſe for cannon being of iron, and thoſe for guns, piſtols, &c. of lead. See SHOOTING.

Caſe SHOT formerly conſiſted of all kinds of old iron, nails, muſket-balls, ſtones, &c. uſed as above.

SHOT of a Cable, on ſhip-board, is the ſplicing of two cables together, that a ſhip may ride ſafe in deep waters and in great roads; for a ſhip will ride eaſier by one ſhot of a cable, than by three ſhort cables out ahead.

Grape-SHOT. See *GRAPE-Shot*.

Patent-milled SHOT is thus made: Sheets of lead, whoſe thickneſs correſponds with the ſize of the ſhot required, are cut into ſmall pieces, or cubes, of the form of a die. A great quantity of theſe little cubes are put into a large hollow iron cylinder, which is mounted horizontally and turned by a winch; when by their friction againſt one another and againſt the ſides of the cylinder, they are rendered perfectly round and very ſmooth. The other patent ſhot is caſt in moulds, in the ſame way as bullets are.

SHOT Flaggon, a ſort of flaggon ſomewhat bigger than ordinary, which in ſome counties, particularly Derbyſhire, it is the cuſtom for the hoſt to ſerve his gueſts in, after they have drank above a ſhilling.

Small SHOT, or that uſed for fowling, ſhould be well ſized, and of a moderate bigneſs: for ſhould it be too great, then it flies thin, and ſcatters too much; or if too ſmall, then it hath not weight and ſtrength to penetrate far, and the bird is apt to fly away with it. In order, therefore, to have it ſuitable to the occaſion, it not being always to be had in every place fit for the purpoſe, we ſhall ſet down the true method of making all ſorts and ſizes under the name of *mould-ſhot*. Its principal good properties are to be round and ſolid.

Take any quantity of lead you think fit, and melt it down in an iron veſſel; and as it melts keep it ſtirring with an iron ladle, ſkimming off all impurities whatſoever that may ariſe at the top: when it begins to look of a greeniſh colour, ſtrew on it as much auripigmentum or yellow orpiment, finely powdered, as will lie on a ſhilling, to every 12 or 14 pound of lead; then ſtirring them together, the orpiment will flame.

The ladle ſhould have a notch on one ſide of the brim, for more eaſily pouring out the lead; the ladle muſt remain in the melted lead, that its heat may be the ſame with that of the lead, to prevent inconveniences which otherwiſe might happen by its being either too hot or too cold: then, to try your lead, drop a little of it into water, and if the drops prove round, then the lead is of a proper heat; if otherwiſe, and the ſhot have tails, then add more orpiment to increaſe the heat, till it be found ſufficient.

Then take a plate of copper, about the bigneſs of a trencher, which muſt be made with a hollowneſs in the middle, about three inches compaſs, within which muſt be bored about 40 holes according to the ſize of the ſhot which you intend to caſt: the hollow bottom ſhould be thin; but the thicker the brim, the better it will retain the heat. Place this plate on a frame of iron, over a tub or veſſel of water, about four inches from the water, and ſpread burning coals on the plate, to keep the lead melted upon it: then take ſome lead and pour it gently on the coals on the plate, and it will make its way through the holes into the water, and form itſelf into ſhot; do this till all your lead be run through the holes of the plate, taking care, by keeping your coals alive, that the lead do not cool, and ſo ſtop up the holes. Shot, Shovel.

While you are caſting in this manner, another perſon with another ladle may catch ſome of the ſhot, placing the ladle four or five inches underneath the plate in the water, by which means you will ſee if they are defective, and rectify them.

Your chief care is to keep the lead in a juſt degree of heat, that it be not ſo cold as to ſtop up the holes in your plate, nor ſo hot as to cauſe the ſhot to crack: to remedy the heat, you muſt refrain working till it is of a proper coolneſs; and to remedy the coolneſs of your lead and plate, you muſt blow your fire; obſerving, that the cooler your lead is, the larger will be your ſhot; as the hotter it is, the ſmaller they will be.

After you have done caſting, take them out of the water, and dry them over the fire with a gentle heat, ſtirring them continually that they do not melt; when dry, you are to ſeparate the great ſhot from the ſmall, by the help of a ſieve made for that purpoſe, according to their ſeveral ſizes. But thoſe who would have very large ſhot, make the lead trickle with a ſtick out of the ladle into the water, without the plate.

If it ſtop on the plate, and yet the plate be not too cool, give but the plate a little knock, and it will run again; care muſt be had that none of your implements be greaſy, oily, or the like; and when the ſhot, being ſeparated, are found too large or too ſmall for your purpoſe, or otherwiſe imperfect, they will ſerve again at the next operation.

The ſizes of common ſhot for fowling are from N° 1 to 6, and ſmaller, which is called muſtard ſeed, or duſt ſhot; but N° 5 is ſmall enough for any ſhooting whatſoever. The N° 1 may be uſed for wild geeſe; the N° 2 for ducks, widgeons, and other water-fowl; the N° 3 for pheaſants, partridges after the firſt month, and all the fen-fowl; the N° 4 for partridges, woodcocks, &c.; and the N° 5 for ſnipes and all the ſmaller birds.

Tin-Caſe SHOT, in artillery, is formed by putting a great quantity of ſmall iron ſhot into a cylindrical tin-box called a canniſter, that juſt fits the bore of the gun. Leaden bullets are ſometimes uſed in the ſame manner; and it muſt be obſerved, that whatever number or ſizes of the ſhots are uſed, they muſt weigh with their caſes nearly as much as the ſhot of the piece.

SHOVEL, SIR CLOUDESLY, was born about the year 1650 of parents rather in the lower rank of life. He was put apprentice to a ſhoemaker; but diſliking this profeſſion, he abandoned it a few years after, and went to ſea. He was at firſt a cabin boy with Sir Chriſtopher Mynns, but applying to the ſtudy of navigation with indefatigable induſtry, his ſkill as a ſeaman ſoon raiſed him above that ſtation.

The corſairs of Tripoli having committed great outrages on the Engliſh in the Mediterranean, Sir John Narborough was ſent in 1674 to reduce them to reaſon. As he had received orders to try the effects of negociation before he proceeded to hoſtilities, he ſent Mr

Shovel ‖ Shout.

Shovel, who was at that time a lieutenant in his fleet, to demand ſatisfaction. The Dey treated him with a great deal of diſreſpect, and ſent him back without an anſwer. Sir John diſpatched him a ſecond time, with orders to remark particularly the ſituation of things on ſhore. The behaviour of the Dey was worſe than ever. Upon Mr Shovel's return, he informed Sir John that it would be poſſible, notwithſtanding their fortifications, to burn all the ſhips in the harbour. The boats were accordingly manned, and the command of them given to Lieut. Shovel, who ſeized the guardſhip, and burnt four others, without loſing a man. This action ſo terrified the Tripolins, that they ſued for peace.—Sir John Narborough gave ſo favourable an account of this exploit, that Mr Shovel was ſoon after made captain of the Sapphire, a fifth rate ſhip.

In the battle of Bantry-Bay, after the revolution, he commanded the Edgar, and, for his gallant behaviour in that action, was ſoon after knighted by King William. Next year he was employed in tranſporting an army into Ireland; a ſervice which he performed with ſo much diligence and dexterity, that the king raiſed him to the rank of rear-admiral of the blue, and delivered his commiſſion with his own hands. Soon after he was made rear-admiral of the red, and ſhared the glory of the victory at La Hogue. In 1694, he bombarded Dunkirk. In 1703, he commanded the grand fleet in the Mediterranean, and did every thing in his power to aſſiſt the Proteſtants who were in arms in the Cevennes.

Soon after the battle off Malaga, he was preſented by Prince George to Queen Anne, who received him graciouſly, and next year employed him as commander in chief.

In 1705 he commanded the fleet, together with the earls of Peterborough and Monmouth, which was ſent into the Mediterranean; and it was owing to him chiefly that Barcelona was taken. After an unſucceſsful attempt upon Toulon, he ſailed for Gibraltar, and from thence homeward with a part of the fleet. On the 22d of October, at night, his ſhip, with three others, was caſt away on the rocks of Scilly. All on board periſhed. His body was found by ſome fiſhermen on the iſland of Scilly, who ſtripped it of a valuable ring, and afterwards buried it. Mr Paxton, the purſer of the Arundel, hearing of this, found out the fellows, and obliged them to diſcover where they had buried the body. He carried it on board his own ſhip to Portſmouth, from whence it was conveyed to London, and interred with great ſolemnity in Weſtminſter Abbey. A monument was afterwards erected to his memory by the direction of the queen. He married the widow of his patron, Sir John Narborough, by whom he left two daughters, co-heireſſes.

SHOVELER, a ſpecies of ANAS. See ANAS, ORNITHOLOGY *Index*.

SHOULDER-BLADE, a bone of the ſhoulder, of a triangular figure, covering the hind part of the ribs, called by anatomiſts the *ſcapula* and *omoplata*. See ANATOMY.

SHOUT, CLAMOUR, in antiquity, was frequently uſed on eccleſiaſtical, civil, and military occaſions, as a ſign of approbation, and ſometimes of indignation.—Thus as Cicero, in an aſſembly of the people, was expoſing the arrogance of L. Antony, who had had the impudence to cauſe himſelf to be inſcribed the patron of the Romans, the people on hearing this raiſed a ſhout to ſhow their indignation. In the ancient military diſcipline, ſhouts were uſed, 1. Upon occaſion of the general's making a ſpeech or harangue to the army from his tribunal. This they did in token of their approving what had been propoſed. 2. Before an engagement, in order to encourage and ſpirit their own men, and fill the enemy with dread. This is a practice of great antiquity; beſides which, it wants not the authority of reaſon to ſupport it; for as mankind are endowed with two ſenſes, hearing and ſeeing, by which fear is raiſed in the mind, it may be proper to make uſe of the ear as well as the eye for that purpoſe. Shouts were alſo raiſed in the ancient theatre, when what was acted pleaſed the ſpectators. It was uſual for thoſe preſent at the burning of the dead to raiſe a great ſhout, and call the dead perſon by his name before they ſet fire to the pile.

Shout ‖ Shrewſbury.

SHOWER, in *Meteorology*, a cloud condenſed into RAIN.

SHREWMOUSE. See SOREX, MAMMALIA *Index*.

SHREWSBURY, the capital of Shropſhire in England. This town, the metropolis of the county, grew up out of the ruins of Uriconium, anciently a city, now a village called *Wroxeter*, about four miles from it. The Saxons called it *Scrobbes Berig*, from the ſhrubs that grew about it; and from thence the preſent name of *Shrewſbury* is ſuppoſed to have been formed. It is pleaſantly ſituated upon a hill near the Severn, over which there are two handſome bridges. It was a place of note in the Saxon times; after which it was granted by William the Conqueror, together with the title of *earl* and moſt of the county, to Roger de Montgomery, who built a caſtle upon the north ſide of it, where the Severn, that encompaſſes it on all other ſides, leaves an opening. His ſon Robert built alſo a wall acroſs this neck of land, when he revolted from Henry I. We learn from doomſday-book, that at that time, when a widow of this town married, ſhe paid 20 ſhillings to the king, and a virgin 10. The above-mentioned Roger founded alſo, and endowed here, a Benedictine monaſtery and a collegiate church. When old age came upon him, he quitted the world, and ſpent the reſt of his days as a monk in the abbey, and when he died was interred in its church. From the hiſtory of this church and monaſtery, it appears that eccleſiaſtical benefices about that time were hereditary. The abbey became ſo rich afterwards, that the abbot was mitred, and ſat in parliament. Beſides this abbey, in after times there were three others, viz. a Franciſcan, Dominican, and Auguſtin; and likewiſe two collegiate churches, one dedicated to St Chad and the other to St Mary. In the conteſt between the empreſs Maud and Stephen, this town and its governor William Fitz-Allan ſided with the empreſs. In Henry III.'s time, a part of it was burnt down by the Welch; and in Richard II.'s reign a parliament was held in it. At a place called *Battle-field*, near this town, Henry Percy the younger, ſurnamed *Hotſpur*, was killed in an engagement with Henry IV. againſt whom he had rebelled. The king afterwards built a chapel upon the ſpot, and endowed it for the ſupport of two prieſts to pray for the ſouls of the ſlain. Two of Edward IV.'s ſons were born here; namely,

Shrewſbury || Shropſhire.

namely, Richard, duke of York, whom Perkin Warbeck afterwards perſonated, and who was murdered in the Tower; and George Plantagenet, who died before his brothers. Here firſt broke out the ſweating-ſickneſs, which carried off great numbers ſo ſuddenly, that thoſe who were ſeized with it either died or recovered in the ſpace of 24 hours. In the beginning of the civil wars, King Charles I. came hither, and formed an army, with which he marched towards London; but was met by the parliament's forces at Edgehill. He continued here from the 20th of September to the 12th of October, during which time he was joined by Prince Rupert, and many of the gentry and nobility of theſe parts. This town anciently gave title of earl to the Montgomeries, and afterwards to the Talbots, by whom it is ſtill retained. Here is a free grammar-ſchool, with three maſters, and ſeveral uſhers, well endowed by Edward VI. and Queen Elizabeth, and not inferior to many colleges in the univerſities. It has a good library and chapel, and there are ſeveral ſcholarſhips appropriated to it in the univerſity of Cambridge. Here are alſo ſeveral hoſpitals, alms-houſes, and charity-ſchools. This town is one of the moſt flouriſhing in England, having two great weekly markets for corn, cattle, and proviſions; and another for Welch cottons and flannels, of which great quantities are ſold. A great trade is carried on with the Welch, who bring their commodities hither, as to the common mart of both nations. The town is large and well-built, and the ſituation extremely pleaſant. There is a very beautiful walk called the *quarry*, between the town walls and the Severn, delightfully ſhaded with rows of lime-trees, ſo that it is not inferior to the Mall in St James's Park. The town is alſo noted for its gallantry and politeneſs, being full of gentry, for whom there are always balls and aſſemblies once a-week all the year round.—Here is a fine houſe and gardens, which belonged to the earl of Bradford; and in the neighbourhood, at Wroxeter, the Roman highway, called Watling-ſtreet, may be ſeen for ſeveral miles, where Roman coins are frequently found. In Shrewſbury are 12 incorporated trading companies; and the corporation has a power to try even capital cauſes of itſelf, except high treaſon. It is ſaid that thigh-bones of dead men have been found here a yard long, and teeth three inches round and three long.

SHRIKE. See LANIUS, ORNITHOLOGY *Index*.

SHRIMP. See CANCER, ENTOMOLOGY *Index*.

SHRINE, in *Eccleſiaſtical Hiſtory*, a caſe or box to hold the relics of ſome ſaint.

SHROPSHIRE, a county of England, bounded on the ſouth by Worceſterſhire, Herefordſhire, and Radnorſhire; on the north, by Cheſhire; on the eaſt, by Staffordſhire; on the weſt, by Montgomeryſhire and Denbighſhire, in Wales. Its length is between 49 and 50 miles, its breadth about 38, and its circumference about 210. It is an inland county, containing 890,000 acres, 167,639 inhabitants, and 15 hundreds, in which are 170 pariſhes, and 15 market towns. It makes a part of three biſhoprics, viz. Hereford, Coventry and Litchfield, and St Aſaph. Some part of it lies on the north, and ſome on the ſouth ſide of the Severn. Beſides the Severn, it is alſo watered by the *Temd* or *Teſidiane*, as it is called in Welch, which flows from the mountains of Radnorſhire; and by the Tern, which has its riſe and name from one of thoſe pools called *tearnes*, in Staffordſhire. All theſe abound with fiſh, eſpecially trouts, pikes, lampreys, graylings, carp, and eels. The air, eſpecially upon the hills, with which the county abounds, is very wholeſome. There is as great a diverſity of ſoil as in moſt other counties. On the hills, where it is poor, is very good paſture for ſheep; and in the low grounds, where it is very rich, along the Severn in particular, there is plenty of graſs for bay and black cattle, with all ſorts of corn. This county is abundantly provided with fuel, having in it many extenſive mines of coal; it has alſo mines of lead and iron. Over moſt of the coal-pits in this county lies a ſtratum or layer of blackiſh porous rock, of which, by grinding and boiling, they make pitch and tar, which are rather better than the common ſort for caulking ſhips, as they do not crack, but always continue cloſe and ſmooth. Quarries of lime-ſtone and iron-ſtone are common in the county, and the ſoil in many places is a reddiſh clay. The abundance of coal and iron-ſtone in this county has given riſe to numerous manufactories.

Shropſhire || Shrove.

As it lies upon the borders of Wales, it was anciently full of caſtles and walled towns. On the ſide next that country there was an almoſt continued line of caſtles, to guard the county againſt the inroads and depredations of the Welch. The borders here, as thoſe between England and Scotland, were called *marches*, and there were certain noblemen entitled *barones marchiæ*, *marchiones de marchia Walliæ*, "lords of the marches, or marquiſſes of the marches of Wales," who were veſted with a ſort of palatine juriſdiction, held courts of juſtice to determine controverſies, and enjoyed many privileges and immunities, the better to enable and encourage them to protect the county againſt the incurſions of the Welch, and to maintain order amongſt the borderers; but they often abuſed their power, and were the greateſt of tyrants.

As to the eccleſiaſtical government of the county, the far greater part, namely, all that belongs to the biſhoprics of Hereford, and of Litchfield and Coventry, is under the juriſdiction and viſitation of the archdeacon of Shrewſbury or Salop, and is divided into ſeveral deanries.

The Oxford circuit includes in it this county, which ſends 12 members to parliament, viz. two for the ſhire, and two for each of the following towns, Shrewſbury, Ludlow, Wenlock, and Biſhop's Caſtle.

SHROVE-TUESDAY, is the Tueſday after Quinquageſima Sunday, or the day immediately preceding the firſt of Lent; being ſo called from the Saxon word *ſhrive*, which ſignifies "to confeſs." Hence Shrove-Tueſday ſignifies Confeſſion-Tueſday; on which day all the people in every pariſh throughout England (during the Romiſh times) were obliged to confeſs their ſins, one by one, to their own pariſh-prieſts, in their own pariſh-churches; and, that this might be done the more regularly, the great bell in every pariſh was rung at ten o'clock (or perhaps ſooner), that it might be heard by all, and that they might attend, according to the cuſtom then in uſe. And though the Romiſh religion has now given way to the Proteſtant religion, the cuſtom of ringing the great bell in our ancient pariſh-churches, at leaſt in ſome of them, ſtill remains, and obtains in and about London the name of Pancake bell; perhaps, becauſe after the confeſſion it was cuſtomary for the ſeveral perſons to dine on pancakes or fritters. Moſt churches

Shrouds, Shrub.

churches, indeed, have rejected that cuſtom of ringing the bell on Shrove-Tueſday; but the uſage of dining on pancakes or fritters, and ſuch like proviſion, ſtill continues.

SHROUDS (*ſcrud* Sax.), a range of large ropes extending from the maſt heads to the right and left ſide of the ſhip, to ſupport the maſts, and enable them to carry ſail, &c.

The ſhrouds as well as the ſails are denominated from the maſts to which they belong. Thus they are the main, fore, and mizen ſhrouds; the main-top-maſt, fore-top-maſt, or mizen-top maſt ſhrouds; and the main-top-gallant, fore-top-gallant, or mizen-top-gallant ſhrouds. The number of ſhrouds by which a maſt is ſuſtained, as well as the ſize of rope of which they are formed, is always in proportion to the ſize of the maſt and the weight of the ſail it is intended to carry.

Bowſprit ſhrouds are thoſe which ſupport the bowſprit. Bumkin ſhrouds are thoſe which ſupport the bumkins. Futtock ſhrouds are ſhrouds which connect the efforts of the topmaſt ſhrouds to the lower ſhrouds. Bentinck ſhrouds are additional ſhrouds to ſupport the maſts in heavy gales. Preventer ſhrouds are ſimilar to bentinck ſhrouds, and are uſed in bad weather to eaſe the lower rigging. See MAST and SAIL.

SHRUB, *frutex*, a little, low, dwarf tree, or a woody vegetable, of a ſize leſs than a tree; and which, inſtead of one ſingle ſtem, frequently from the ſame root puts forth ſeveral ſets or ſtems. See PLANT and TREE. Such are privet, phillyrea, holly, box, honey-ſuckle, &c. Shrubs and trees put forth in autumn a kind of buttons, or gems, in the axis of the leaves; theſe buttons are as ſo many little ova, which, coming to expand by the warmth of the following ſpring, open into leaves and flowers. By this, together with the height, ſome diſtinguiſh ſhrubs from *ſuffrutices*, or under ſhrubs, which are low buſhes, that do not put forth any of theſe buttons, as ſage, thyme, &c.

The two hardieſt ſhrubs we are poſſeſſed of are the ivy and box; theſe ſtand the ſeverity of our ſharpeſt winters unhurt, while other ſhrubs periſh, and trees have their ſolid bodies ſplit and torn to pieces. In the hard winter of the year 1683, theſe two ſhrubs ſuffered no injury any where; though the yews and hollies, which are generally ſuppoſed very hardy, were that winter in ſome places killed, and in others ſtripped of their leaves, and damaged in their bark. Furze-buſhes were found to be ſomewhat hardier than theſe, but they ſometimes periſhed, at leaſt down to the root. The broom ſeemed to occupy the next ſtep of hardineſs beyond theſe. This lived where the others died, and where even this died, the juniper ſhrubs were ſometimes found unhurt. This laſt is the only ſhrub that approaches to the hardineſs of the box and ivy, but even it does not quite come up to them; for while they ſuffer nothing in whatever manner they are expoſed, the juniper, though it bears cold well under the ſhelter of other trees, yet cannot bear the viciſſitudes of heat and cold; inſomuch that ſome juniper ſhrubs were found half dead and half vigorous; that ſide which faced the mid-day ſun having periſhed by the ſucceſſive thawings and freezings of its ſap; while that which was not expoſed to the viciſſitudes of heat had born the cold perfectly well. Such ſhrubs as are not hardy enough to defy the winter, but appear half dead in the ſpring, may often be recovered by Mr Evelyn's method of beating their branches with a ſlender hazel-wand, to ſtrike off the withered leaves and buds, and give a free paſſage to the air to the internal parts. Where this fails, the method is to cut them down to the quick, and if no part of the trunk appears in a growing condition, they muſt be taken off down to the level of the ground. Philoſophical Tranſactions, N° 165.

Shrub ‖ Siam.

SHUTTLE, in the manufactures, an inſtrument uſed by the weavers, which guides the thread it contains, either of woollen, ſilk, flax, or other matter, ſo as to make it form the woofs of ſtuffs, cloths, linens, ribbands, &c. by throwing the ſhuttle alternately from left to right, and from right to left, acroſs between the threads of the warp, which are ſtretched out lengthwiſe on the loom.

In the middle of the ſhuttle is a kind of cavity, called the *eye* or *chamber* of the ſhuttle; wherein is incloſed the ſpoul, which is a part of the thread deſtined for the woof; and this is wound on a little tube of paper, ruſh, or other matter.

The ribband-weaver's ſhuttle is very different from that of moſt other weavers, though it ſerves for the ſame purpoſe: it is of box, ſix or ſeven inches long, one broad, and as much deep; ſhod with iron at both ends, which terminate in points, and are a little crooked, the one towards the right, and the other towards the left, repreſenting the figure of an ∞ horizontally placed. See WEAVING.

SIALOGOGUES, medicines which promote the ſalivary diſcharge.

SIAM PROPER, by ſome called *Upper*, (to diſtinguiſh it from the *Lower* Siam, under which are often included Laos, Cambodia, and Malacca), is bounded on the north by the kingdoms of Pegu and Laos; on the eaſt by Cambodia and Cochin-China; on the ſouth by Malacca and the bay of Siam; and on the weſt by the ocean. But as the opinions of geographers are extremely various concerning the ſituation and extent of moſt of the inland countries of Aſia and Africa, neither the extent nor boundaries of Siam are yet accurately known. By ſome it is ſuppoſed to extend 550 miles in length, and 250 miles in breadth; in ſome places it is not above 50 miles broad. 1 Boundaries and extent.

The winds blow here from the ſouth upon the coaſt of Siam, in March, April, and May; in April the rains begin, in May and June they fall almoſt without ceaſing. In July, Auguſt, and September, the winds blow from the weſt, and the rains continuing, the rivers overflow their banks nine or ten miles on each ſide, and for more than 150 miles up the ſtream, At this time, and more particularly in July, the tides are ſo ſtrong as to come up the river Menan as far as the city of Siam, which is ſituated 60 miles from its mouth; and ſometimes as far as Louvo, which is 50 miles higher. The winds blow from the weſt and north in October, when the rain ceaſes. In November and December the winds blow dry from the north, and the waters being in a few days reduced to their ancient channels, the tides become ſo inſenſible, that the water is freſh at the mouth of the river. At Siam there is never more than one flood and one ebb in the ſpace of 24 hours. In January the wind blows from the eaſt, and in February from the eaſt and ſouth. When the wind is at eaſt, the 2 Weather.

Siam. the current ſets to the weſt; and, on the contrary, when the wind is at weſt, the currents run to the eaſtward.

As this country is ſituated near the tropic, it muſt neceſſarily be very hot; but yet, as in other places nearly of the ſame latitude, when the ſun is vertical and ſhines with a moſt intenſe heat, the inhabitants are ſo ſkreened by the clouds, and the air is ſo refreſhed by a deluge of rain that overflows the plains which the people chiefly inhabit, that the heat is very ſupportable. The cooleſt wind blows in December and January.

3 Vegetable productions. The vegetable produce of this country is chiefly rice and wheat, beſides tropical and a few European fruits. The Siameſe prepare the land for tillage as ſoon as the earth is ſufficiently moiſtened by the floods. They plant their rice before the waters riſe to any conſiderable height, and, as they riſe ſlowly, the rice keeps pace with them, and the ear is always above the water. They reap their corn when the water retires, and ſometimes go in boats to cut it while the waters are upon the ground. They alſo ſow rice in ſeveral parts of the kingdom that are not overflowed, and this is thought better taſted, and will keep longer than the other; but they are forced to ſupply theſe fields conſtantly with water, while the rice is growing, from baſins and ponds that lie about them.

They have no European fruits except oranges, lemons, citrons, and pomegranates. They have bananas, Indian figs, jaques, durions, mangoes, mangoſtans, tamarinds, ananas, and cocoa nuts; they have alſo abundance of pepper and ſugar-canes. The mountains are covered with trees which make good maſts. The vegetable of greateſt uſe in the country is the bamboo, which grows chiefly in marſhy ſoils, and is often found of a prodigious ſize. Cotton trees are found in great numbers; and others that yield *capoc*, a very fine cotton wool, but ſo ſhort as to be unfit for ſpinning, though it anſwers very well for ſtuffing mattreſſes and pillows.

4 Animals. There is no country where elephants abound more than in Siam, or where they are held in greater veneration. They have a few horſes, ſheep, and goats, beſides oxen and buffaloes; but they have no good animal food except the fleſh of hogs, their beef and mutton being of a very indifferent quality.

5 Deſcription of the inhabitants. The Siameſe are of ſmall ſtature, but well proportioned; their complexions are ſwarthy: the faces of both the men and women are broad, and their foreheads, ſuddenly contracting, terminate in a point, as well as their chins. They have ſmall black eyes, hollow jaws, large mouths, and thick pale lips. Their teeth are dyed black, their noſes are ſhort and round at the end, and they have large ears, which they think very beautiful. Their hair is thick and lank, and both ſexes cut it ſo ſhort that it reaches no lower than their ears; the women make it ſtand up on their foreheads; and the men ſhave their beards.

6 Dreſs. People of diſtinction wear a piece of calico tied about their loins, that reaches down to their knees.—The men bring up this cloth between their legs, and tuck it into their girdles, which gives it the appearance of a pair of breeches. They have alſo a muſlin ſhirt without a collar, with wide ſleeves, no wriſtbands, and the boſom open. In winter they wear a piece of ſtuff or painted linen over their ſhoulders, like a mantle, and wind it about their arms. Siam.

The king of Siam is diſtinguiſhed by wearing a veſt of brocaded ſatin, with ſtraight ſleeves that reach down to the wriſt, under ſuch a ſhirt as we have juſt deſcribed, and it is unlawful for any ſubject to wear this dreſs unleſs he receives it from the king. They wear ſlippers with piked toes turned up, but no ſtockings. The king ſometimes preſents a military veſt to the generals; this is buttoned before, and reaches to the knees; but the ſleeves are wide, and come no lower than the elbows. All the retinue of the king, either in war or in hunting, are clothed in red. The king wears a cap in the form of a ſugar-loaf, encompaſſed by a coronet or circle of precious ſtones, and thoſe of his officers have a circle of gold, ſilver, or of vermilion gilt, to diſtinguiſh their quality; and theſe caps are faſtened with a ſtay under the chin; they are only worn when they are in the king's preſence, or when they preſide in courts of juſtice, and on other extraordinary occaſions. They have alſo hats for travelling; but, in general, few people cover their heads notwithſtanding the ſcorching heat of the ſun.

The women alſo wrap a cloth about their middle, which hangs down to the calf of their legs. They cover their breaſts with another cloth, the ends of which hang over their ſhoulders. But they have no garment correſponding to a ſhift, nor any covering for their heads but their hair. The common people are almoſt naked, and wear neither ſhoes nor ſlippers. The women wear as many rings on the three laſt fingers of each hand as they can keep on, and bracelets upon their wriſts and ancles, with pendants in their ears ſhaped like a pear.

7 Manners and cuſtoms. For an inferior to ſtand before a ſuperior is deemed inſolent; and therefore ſlaves and people of inferior rank ſit upon their heels, with their heads a little inclined, and their joined hands lifted up to their foreheads. In paſſing by a ſuperior they bend their bodies, joining their hands, and lifting them toward their heads in proportion to the reſpect they would ſhow. When an inferior pays a viſit, he enters the room ſtooping, proſtrates himſelf, and then remains upon his knees, ſitting upon his heels without ſpeaking a word till he is addreſſed by the perſon whom he viſits; for he that is of the higheſt quality muſt always ſpeak firſt. If a perſon of rank viſits an inferior, he walks upright, and the maſter of the houſe receives him at the door, and waits on him ſo far when he goes away, but never farther.

The higheſt part of the houſe is eſteemed the moſt honourable, and no perſon cares to lodge under another's feet. The Siameſe indeed have but one ſtory, but the rooms riſe gradually, and the innermoſt, which are the higheſt, are always the moſt honourable. When the Siameſe ambaſſador came to the French court, ſome of his retinue were lodged in a floor over the ambaſſador's head; but they no ſooner knew it, than they were ſtruck with the greateſt conſternation, and ran down tearing their hair at the thoughts of being guilty of what they conſidered as ſo unpardonable a crime.

The Siameſe never permit ſuch familiarities as are practiſed by gentlemen in Europe. Eaſineſs of acceſs, and

Siam.

and affability to inferiors, is in that part of the world thought a ſign of weakneſs, and yet they take no notice of ſome things which would be looked upon as ill breeding among us; ſuch as belching in company, which no man endeavours to prevent, or ſo much as holds his hand before his mouth. They have an extraordinary reſpect for the head, and it is the greateſt affront to ſtroke or touch that of another perſon; nay, their cap muſt not be uſed with too much familiarity; for when a ſervant carries it, it is put on a ſtick and held above his head; and when the maſter ſtands ſtill the ſtick is ſet down, it having a foot to ſtand upon. They alſo ſhow their reſpect by lifting their hands to the head; and therefore, when they receive a letter from any one for whom they have a great reſpect, they immediately hold it up to their heads, and ſometimes lay it upon their heads.

8 Genius and diſpoſitions.

They are eſteemed an ingenious people, and though rather indolent than active in diſpoſition, they are not addicted to the voluptuous vices which often accompany a ſtate of eaſe, being remarkably chaſte and temperate, and even holding drunkenneſs in abhorrence.—They are, however, accounted inſolent towards their inferiors, and equally obſequious to thoſe above them; the latter of which qualities appears to be particularly inculcated from their earlieſt youth. In general, their behaviour is extremely modeſt, and they are averſe to loquacity. Like the Chineſe, they avoid ſpeaking in the firſt perſon: and when they addreſs a lady, it is always with ſome reſpectful epithet, inſinuating perſonal accompliſhments.

No man in this country learns any particular trade, but has a general knowledge of all that are commonly practiſed, and every one works ſix months for the king by rotation; at which time, if he ſhould be found perfectly ignorant of the buſineſs he is ſet about, he is doomed to ſuffer the baſtinado. The conſequence of this burdenſome ſervice is, that no man endeavours to excel in his buſineſs, leſt he ſhould be obliged to practiſe it as long as he lives for the benefit of the crown.

9 Government.

The government of this country is extremely oppreſſive, the king being not only ſovereign but proprietor of all the lands, and chief merchant likewiſe; by which means he monopolizes almoſt the whole traffic, to the great prejudice of his ſubjects. The crown is ſaid to be hereditary, but it is often transferred by revolutions, on account of the exorbitant abuſe of power in thoſe who exerciſe the royal office. In his palace, the king is attended by women, who not only prepare his food, and wait on him at table, but even perform the part of valets, and put on all his clothes, except his cap, which is conſidered as too ſacred to be touched by any hand but his own. He ſhows himſelf to the people only twice a-year, when he diſtributes his alms to the talapoins or prieſts: and on thoſe occaſions he always appears in an elevated ſituation, or mounted on the back of an elephant. When he takes the diverſion of hunting, he is as uſual attended by his women on foot, preceded by a guard of 200 men, who drive all the people from the roads through which they are to paſs; and when the king ſtops, all his attendants fall upon their faces on the ground.

10 Forms of proceſs.

All their proceedings in law are committed to writing, and none is ſuffered to exhibit a charge againſt another, without giving ſecurity to proſecute it, and anſwer the damages if he does not prove the fact againſt the perſon accuſed. When a perſon intends to proſecute another, he draws up a petition, in which he ſets forth his complaint, and preſents it to the *nai*, or head of the band to which he belongs, who tranſmits it to the governor; and if the complaint appears frivolous, the proſecutor, according to the laws of the country, ſhould be puniſhed; but the magiſtrates generally encourage proſecutions on account of the perquiſites they bring to their office.

Siam.

Every thing being prepared for hearing, the parties are ſeveral days called into court, and perſuaded to agree; but this appears to be only a matter of form. At length the governor appoints a day for all parties to attend; and being come into court, the clerk reads the proceſs and opinion of his aſſociates, and then the governor examines upon what reaſons their opinions are founded; which being explained to him, he proceeds to paſs judgement.

11 Trial by ordeal.

When ſufficient proofs are wanting, they have recourſe to an ordeal trial, like that of our Saxon anceſtors: both the plaintiff and the defendant walk upon burning coals, and he that eſcapes unhurt is adjudged to be in the right: ſometimes the proof is made by putting their hands in boiling oil; and in both theſe trials, by ſome peculiar management, one or the other is ſaid to remain unhurt. They have alſo a proof by water, in which he who remains longeſt under it is eſteemed innocent. They have another proof, by ſwallowing pills, which their prieſts adminiſter with ſevere imprecations; and the party who keeps them in his ſtomach without vomiting is thought to be innocent.

All theſe trials are made in the preſence of the magiſtrates and people; and the king himſelf frequently directs them to be performed, when crime comes before him by way of appeal. Sometimes he orders both the informer and priſoner to be thrown to the tigers: and the perſon that eſcapes by his not being ſeized upon by thoſe beaſts, is ſufficiently juſtified.

12 Religious opinions.

They maintain the doctrine of tranſmigration, believing in a pre-exiſtent ſtate, and that they ſhall paſs into other bodies till they are ſufficiently purified to be received into paradiſe. They believe likewiſe that the ſoul is material, but not ſubject to the touch; that it retains the human figure after quitting a body of that ſpecies; and that when it appears to perſons with whom it was acquainted, which they ſuppoſe it to do, the wounds of one that has been murdered will then be viſible. They are of opinion that no man will be eternally puniſhed; that the good, after ſeveral tranſmigrations, will enjoy perpetual happineſs; but that thoſe who are not reformed will be doomed to tranſmigration to all eternity. They believe in the exiſtence of a Supreme Being; but the objects of their adoration are departed ſaints, whom they conſider as mediators or interceſſors for them; and to the honour of this numerous tribe both temples and images are erected.

13 Marriages.

The men of this country are allowed a plurality of women; but excepting one, who is a wife by contract, the others are only concubines, and their children deemed incapable of any legal inheritance. Previous to every nuptial contract, an aſtrologer muſt be conſulted, who calculates the nativity of the parties, and determines whether their union is likely to prove fortunate

or

Siam || Sibenico.

or otherwiſe. When his prognoſtication is favourable, the lover is permitted to viſit his miſtreſs three times, at the laſt of which interviews the relations being preſent, the marriage portion is paid, when, without any religious ceremony performed, the nuptials are reckoned complete, and ſoon after conſummated. A few days after the talapoin viſits the married couple, ſprinkles them with water, and repeats a prayer for their proſperity.

14 Funerals.

The practice in Siam reſpecting funerals, is both to burn and bury the dead. The corpſe being laid upon the pile, it is ſuffered to burn till a conſiderable part is conſumed, when the remainder is interred in a burying-place contiguous to ſome temple. The reaſon which they give for not burning it entirely to aſhes is, that they ſuppoſe the deceaſed to be happy when part of his remains eſcapes the fire. Inſtead of a tombſtone, they erect a pyramid over the grave. It was formerly the cuſtom to bury treaſure with the corpſe; but longer experience evincing, that the ſacrilegious light in which robbing the graves was conſidered did not prevent the crime, they now diſcontinue the ancient practice, and inſtead of treaſure bury only painted papers and other trifles.

15 Rivers.

The two principal rivers are the Menan and the Mecon, which riſe in the mountains of Tartary, and run to the ſouth; the former paſſing by the city of Siam, falls into the bay of the ſame name, in the 13th degree of north latitude; and the latter running through Laos and Cambodia, diſcharges itſelf into the Indian ocean in the 9th degree of north latitude.

6 Deſcription of the capital.

The capital of the country is Siam, called by the natives *Siyothoya*, ſituated in the 101ſt degree of eaſt longitude, and in the 14th degree of north latitude, being almoſt encompaſſed by the branches of the river Menan. It is about 10 miles in circumference within the walls, but not a ſixth part of the ground is occupied by buildings. In the vacant ſpaces there are near 300 pagodas or temples, round which are ſcattered the convents of the prieſts and their burying-places. The ſtreets of the city are ſpacious, and ſome have canals running through them, over which is a great number of bridges. The houſes ſtand on pillars of the bamboo cane, and are built of the ſame materials: the communication between different families, during the winter ſeaſon, being carried on as in other tropical countries by means of boats. The grounds belonging to the ſeveral tenements are ſeparated by a palliſado, within which the cattle are houſed in barns, erected likewiſe upon pillars, to preſerve them from the annual inundation.

SIBBALDIA, a genus of plants belonging to the claſs of pentandria, and to the order of pentagynia; and in the natural ſyſtem arranged under the 35th order. *Senticoſæ*. See BOTANY *Index*.

SIBENICO, or SEBENICO, the name of a city and province of Dalmatia. The province of Sibenico runs along the ſea for more than 30 miles; reaches in ſome places above 20 miles within land, and comprehends above 70 iſlands. The city of Sibenico is ſituated near the mouth of the river Cherca, in the gulf of Venice, 35 miles north of Spalatto, and 25 ſouth-eaſt of Zara. E. Long. 16° 46′, N. Lat. 44° 17′. It belongs to the Venetians. It is defended on one ſide by a caſtle, which held out againſt repeated attacks of the Turks, and towards the ſea by a fort.

SIBERIA, a large country, comprehending the moſt northerly parts of the Ruſſian empire in Aſia. It is bounded on the eaſt by the eaſtern ocean; on the ſouth by Great Tartary; on the weſt by Ruſſia; and on the north by the Frozen ocean. It is about 2000 miles in length from eaſt to weſt, and 750 miles in breadth from north to ſouth. Siberia.

1 Boundaries and extent.

2 Conquered by the Ruſſians.

At what time this country was firſt inhabited, or by whom it was peopled, we are entirely ignorant; but writings have been found in it when it was diſcovered, which ſhows that it muſt have been early known to a civilized people *. The Ruſſians, from whom we have received our knowledge, knew nothing of it before the middle of the 16th century. In the reign of John Baſilowitz I. indeed, an incurſion had been made into Siberia, and ſome Tartar tribes ſubdued: but theſe conqueſts were not permanent; and we hear of no further communication between Ruſſia and Siberia till the time of John Baſilowitz II. It was opened again at that time by means of one Anika Strogonoff, a Ruſſian merchant, who had eſtabliſhed ſome ſalt-works at a town in the government of Archangel. This man carried on a trade with the inhabitants of the north-weſt parts of Siberia, who brought every year to the town abovementioned large quantities of the fineſt furs. Thus he acquired a very conſiderable fortune in a ſhort time; when at laſt the czar, perceiving the advantages which would accrue to his ſubjects from having a regular intercourſe with Siberia, determined to enlarge the communication which was already opened. With this view he ſent into Siberia a body of troops, which croſſed the Yugorian mountains, that form part of the north-eaſtern boundary of Europe. They ſeem, however, not to have paſſed the Irtiſh, or to have penetrated farther than the weſtern branch of the river Oby. Some Tartar tribes were laid under contribution, and a chief named *Yediger* conſented to pay an annual tribute of 1000 ſables. But this produced no laſting advantage to Ruſſia; for, ſoon after, Yediger was defeated and taken priſoner by Kutchum Khan, a deſcendant of the great Jenghiz Khan: and thus the allegiance of this country to Ruſſia was diſſolved.

* *Bell's Travels.*

For ſome time we hear of no further attempts made by the Ruſſians on Siberia; but in 1577 the foundation of a permanent conqueſt was laid by one Yermac Temofeeff, a Coſſack of the Don. This man was at firſt the head of a party of banditti who infeſted the Ruſſians in the province of Caſan; but being defeated by the troops of the czar, he retired with 6000 of his followers into the interior parts of that province. Continuing his courſe ſtill eaſtward, he came to Orel, the moſt eaſterly of all the Ruſſian ſettlements. Here he took up his winter-quarters: but his reſtleſs genius did not ſuffer him to continue for any length of time in a ſtate of inactivity; and from the intelligence he procured concerning the ſituation of the neighbouring Tartars of Siberia, he turned his arms towards that quarter.

3 State of Siberia at the time of the Ruſſian conqueſt.

Siberia was at that time partly divided among a number of ſeparate princes, and partly inhabited by the various tribes of independent Tartars. Of the former Kutchum Khan was the moſt powerful ſovereign. His dominions conſiſted of that tract of country which now forms the ſouth-weſtern part of the province of Tobolſk; and ſtretched from the banks of the Irtiſh and Oby to

Siberia. thoſe of the Tobol and Tura. His principal reſidence was at Sibir, a ſmall fortreſs upon the river Irtiſh, not far from the preſent town of Tobolſk, and of which ſome ruins are ſtill to be ſeen. After a courſe of unremitted fatigue, and a ſeries of victories which almoſt exceed belief, but of which we have not room to give the detail, our intrepid adventurer diſpoſſeſſed this prince of his dominions, and ſeated himſelf on the throne of Sibir. The number of his followers, however, being greatly reduced, and perceiving he could not depend on the affection of his new ſubjects, he had recourſe to the czar of Muſcovy, and made a tender of his new acquiſitions to that monarch, upon condition of receiving immediate and effectual ſupport. This propoſal was received with the greateſt ſatisfaction by the czar, who granted him a pardon for all former offences, and ſent him the required ſuccours. Yermac, however, being ſoon after drowned in an unſucceſsful excurſion, the Ruſſians began to loſe Siberia. their footing in the country. But freſh reinforcements being ſeaſonably ſent, they not only recovered their ground, but puſhed their conqueſts far and wide; whereever they appeared, the Tartars were either reduced or exterminated. New towns were built, and colonies were planted on all ſides. Before a century had well elapſed, all that vaſt tract of country now called *Siberia*, which ſtretches from the confines of Europe to the Eaſtern ocean, and from the Frozen ſea to the preſent frontiers of China, was annexed to the Ruſſian dominions.

4
The air of Siberia is, in general, extremely piercing, Climate. the cold there being more ſevere than in any other part of the Ruſſian dominions. The Siberian rivers are frozen very early, and it is late in the ſpring before the ice is thawed (A). If the corn does not ripen in Auguſt, there is little hope of a harveſt in this country; and in the

(A) M. Gmelin, M. Muller, and two other philoſophers, ſet out in the year 1733 to explore the dreary regions of Siberia, by deſire of the empreſs Anne of Ruſſia. After ſpending nine years and a half in obſerving every thing that was remarkable, they returned to Peterſburgh; and an account of this journey was publiſhed by M. Gmelin. In order to examine how far the froſt had penetrated into the ground, M. Gmelin, on the 18th of June, at a place called Jacutia, ordered the earth to be dug in high ground; they found mould to the depth of 11 inches, under which they met with looſe ſand to two feet and a half further, after which it grew harder, and at half a foot deeper ſo hard as ſcarcely to give way to the tools; ſo that the ground ſtill remained unthawed at not leſs than the depth of four feet. He made the ſame experiment in a lower ſituation; the ſoil was 10 inches deep, after that a looſe ſand for two feet and ten inches, below which all was frozen and hard. At Jacutia the inhabitants preſerve in cellars ſeveral ſorts of berries, which they reckon among their dainties, perfectly good and freſh the whole year, though theſe cellars are ſcarcely a fathom deep. At the fortreſs of Argun, in little more than 50 degrees of latitude, the inhabitants relate that the earth in many places is never thawed above a yard and a half, and that the internal cold of the earth will ſcarcely permit a well to be dug, of which they bring an inſtance that happened not long before the author's arrival at that place. They deſigned to ſink a well near a houſe at ſome diſtance from the river Argun, for which purpoſe they thawed the earth by degrees, and dug ſome fathoms till they had penetrated a fathom and half below the level of the river, but found no ſpring. Hence perhaps we may venture to aſſert, that beſides the great elevation of the earth in theſe countries, there is another cauſe, perhaps latent in the earth itſelf, of this extraordinary cold, naturally ſuggeſted to us by conſidering the cavity of an old ſilver mine at Argun, which being exhauſted of its ore, now ſerves the inhabitants in ſummer time for a cellar to keep their proviſions: this place is ſo extremely cold as to preſerve fleſh meats from putrefaction in the hotteſt ſummers, and to ſink the mercury in De Liſle's thermometer to 146 and 147. The author travelling from Nerſchoi towards Argun, to viſit the works of the ſilver mines in that place, Auguſt 1735, came to the river Orkija, near Soloniſchaia, on July the 1ſt, from whence he arrived a little before dark at the village of Seventua, diſtant from the river 27 leagues. In this journey he and his fellow travellers for more than four leagues felt it vaſtly cold; ſoon after they came into a warm air, which continued ſome leagues; after which the cold returned; and thus are travellers ſubjected to perpetual viciſſitudes of warmth and cold. But it is obſerved in general, that the eaſtern parts are colder than the weſtern, though ſituated in the ſame latitude; for as in thoſe eaſtern regions ſome tracts of land are much colder than the reſt, their effects muſt be felt by the neighbouring parts. And this conjecture is favoured by the thermometrical obſervations made with M. de L'Iſle's inſtrument in all parts of Siberia, in which the mercury was depreſſed to the 226th degree, even in thoſe parts that lie very much towards the ſouth, as in the territory of Selinga, which ſaid degree anſwers in Fahrenheit's thermometer to about 55.5 below 0, but the ſame thermometer ſometimes indicated a much greater cold. At the fort of Kiringa, on Feb. 10. 1738, at 8 in the morning, the mercury ſtood at 240, which anſwers nearly to 72 below 0 in Fahrenheit's. On the 23d of the ſame month it was a degree lower. At the ſame place, December 11. at three in the afternoon, it ſtood at 254 in De Liſle's thermometer, and very near 90 in Fahrenheit's; on December 29. at four in the afternoon, at 263; on November 27. at noon, at 270; January 9. at 275, which ſeveral depreſſions anſwer in Fahrenheit's to 99.44, 107.73, and 113.65; on January 5. at five in the morning, at 262; an hour after at 281, but at eight o'clock it returned to 250, and there remained till ſix in the afternoon, and then roſe by degrees till an hour before midnight, when it ſtood at 202. So that the greateſt depreſſion of the mercury anſwers in Fahrenheit's thermometer to 120.76 degrees below 0, which is indeed very ſurpriſing, and what nobody ever imagined before. While this cold laſted at Jeniſea, the ſparrows and magpies fell to the ground, ſtruck dead, as it were, with the froſt, but revived if they were ſoon brought into a warm room. The author was told alſo that numbers of wild beaſts were found in the woods dead and ſtiff with the froſt, and ſeveral travellers had their blood and juices quite frozen in their veſſels. The air itſelf at that time was ſo diſmal, that you would think it changed to ice, as it was a thick fog, which was not diſſipable by any exhalations, as in the ſpring and autumn, and the author could ſcarcely ſtand three minutes in the porch of his houſe for the cold.

Siberia. the province of Jeniſeiſk it is ſometimes covered with ſnow before the peaſants can reap it. To defend the inhabitants againſt this extreme ſeverity of the climate, Providence ſeems more liberally to have dealt out to them wood for fuel and furs for clothing. As the winter days in the north parts of Siberia laſt but a few hours, and the ſtorms and flakes of ſnow darken the air ſo much, that the inhabitants, even at noon, cannot ſee to do any thing without artificial lights, they ſleep away the greateſt part of that ſeaſon.

Theſe ſevere winters are rapidly ſucceeded by ſummers, in which the heat is ſo intenſe that the Tunguſians, who live in the province of Jakutſk, go almoſt naked. Here is ſcarcely any night during that ſeaſon; and towards the Frozen ocean the ſun appears continually above the horizon. The vegetables and fruits of the earth are here extremely quick in their growth.

5 Soil and produce. The whole tract of land beyond the 60th degree of north latitude is a barren waſte; for the north part of Siberia yields neither corn nor fruits; though barley is known frequently to come to perfection in Jakutſk.—For this reaſon, the inhabitants of the northern parts are obliged to live on fiſh and fleſh, but the Ruſſians are ſupplied with corn from the ſouthern parts of Siberia, where the ſoil is ſurpriſingly fertile. The countries beyond the lake of Baikal, eſpecially towards the eaſt, as far as the river Argun, are remarkably fruitful and pleaſant; but ſuch is the indolence of the inhabitants, that ſeveral fine tracts of land, which would make ample returns to the peaſant for cultivating them, lie neglected. The paſtures are excellent in this country, which abounds in fine horned cattle, horſes, goats, &c. on which the Tartars chiefly depend for ſubſiſtence. However, there are ſeveral ſteppes, or barren waſtes, and unimprovable tracts in theſe parts; and not a ſingle fruit tree is to be ſeen. There is great variety of vegetables, and in ſeveral places, particularly near Kraſnoia Sloboda, the ground is in a manner overrun with aſparagus of an extraordinary height and delicious flavour. The bulbs of the Turkiſh bundes, and other ſorts of lilies, are much uſed by the Tartars inſtead of bread. This want of fruit and corn is richly compenſated by the great quantities of wild and tame beaſts, and fowls, and the infinite variety of fine fiſh which the country affords (B).

In that part of Siberia which lies near the Icy ſea, as well as in ſeveral other places, are woods of pine, larch, and other trees; beſides which, a conſiderable quantity of wood is thrown aſhore by the waves of the Icy ſea; but whence it comes is not yet aſcertained.

6 Wild beaſts. Beſides the wild fowl with which Siberia abounds, there is a prodigious number of quadrupeds, ſome of which are eatable, and others valuable for their ſkins or furs. Siberia.

The animals moſt valued for their ſkins are the black fox, the ſable, the hyena, the ermine, the ſquirrel, the beaver, and the lynx. The ſkin of a real black fox is more eſteemed than even that of a ſable. In the country near the Frozen ocean are alſo blue and white foxes. The fineſt ſables come from Nertſhinſk and Jakutſk, the inhabitants of which places catch them in the mountains of Stannowoi Krebet. The tributary nations were formerly obliged to pay their taxes in the ſkins of foxes and ſables only. But now the ſkins of ſquirrels, bears, rein-deer, &c. and ſometimes money, are received by way of tribute; and this not only from thoſe who live near the Lena, but alſo in the governments of Ilinſk, Irkutzk, Selenginſk, and Nertſhinſk. When the Tartars firſt became tributary to Ruſſia, they brought their furs indiſcriminately as they caught them, and among them were often ſables of extraordinary value; and formerly, if any trader brought with him an iron kettle, they gave him in exchange for it as many ſables as it would hold. But they are now better acquainted with their value. They ſell their ſables to ſmugglers at a very high price, and pay only a ruble inſtead of a ſkin to the revenue officers, who now receive more ready money than ſables, by way of tribute. The ſubjects plead the ſcarcity of furs, and indeed not without ſome appearance of truth.

7 Minerals. Siberia has ſtill other and more valuable treaſures than thoſe we have yet mentioned. The ſilver mines of Argun are extremely rich; the ſilver they produce yields ſome gold, and both of theſe are found among the copper ore of Koliwan. This country is alſo particularly rich in copper and iron ore. The former lies even upon the ſurface of the earth; and conſiderable mines of it are found in the mountains of Pictow, Koliwan, Ploſkau, Woſkereſenſk, Kuſwi, Alepaik, and ſeveral others, and in the government of Kraſnoiarſk (C). Iron is ſtill more plentiful in all theſe places, and very good; but that of Kamenſki is reckoned the beſt. Several hundred thouſand puds of theſe metals are annually exported from the ſmelting houſes, which belong partly to the crown, and partly to private perſons. Moſt of them lie in the government of Catharinenburg. The Tartars alſo extract a great quantity of iron from the ore.

8 Precious ſtones. The topazes of Siberia have a fine luſtre; and in open ſandy places, near the river Argun, as well as on the banks of other rivers and lakes, are found ſingle ſmall pieces of agate. Here are alſo carnelians and green jaſper with red veins. The latter is chiefly met with in the deſerts of Gobiſkoi.

9 Marienglas. The famous marienglas, or lapis ſpecularis, great quantities

(B) The oak, though frequent in Ruſſia, it is ſaid, is not to be found through this vaſt region nearer than the banks of the Argun and Amur, in the dominions of China. The white poplar, the aſpen, the black poplar, the common ſallow, and ſeveral ſpecies of the willow, are very common. The Norway and ſilver fir form great foreſts; but the former does not grow beyond the 60th degree of north latitude, and the latter not beyond 58 degrees. To this dreary region of Siberia, Europe is indebted for that excellent ſpecies of oats called *Avena Sibirica*; and our gardens are enlivened with the gay and brilliant flowers brought from the ſame country.

(C) The copper mines of Koliwan, from which gold and ſilver are extracted, employ above 40,000 people. The ſilver mines of Nertſhinſk, beyond Lake Baikal, employ above 14,000. The whole revenue ariſing from theſe mines, according to Mr Coxe, is not leſs than 679,182l. 13s.

Siberia. quantities of which are dug up in Siberia, is by ſome called Muſcovy or Ruſſian glaſs. It is a particular ſpecies of tranſparent ſtone, lying in ſtrata like ſo many ſheets of paper. The matrix, or ſtone in which it is found, is partly a light yellow quartz, or marcaſſia, and partly a brown indurated fluid; and this ſtone contains in it all the ſpecies of the marienglas. To render the marienglas fit for uſe, it is ſplit with a thin two-edged knife; but care is taken that the laminæ be not too thin. It is uſed for windows and lanterns all over Siberia, and indeed in every part of the Ruſſian empire, and looks very beautiful; its luſtre and clearneſs ſurpaſſing that of the fineſt glaſs, to which it is particularly preferable for windows and lanterns of ſhips, as it will ſtand the exploſion of cannon. It is found in the greateſt plenty near the river Witim.

10 Magnets. Siberia affords magnets of an extraordinary ſize, and even whole mountains of loadſtone. Pit-coal is alſo dug up in the northern parts of this country. The kamennoe maſlo, a yellowiſh kind of alum, unctuous and ſmooth to the touch, like tophus, is found in the mountains of Kraſnoiarſk, Ural, Altaiſh, Jeniſea, Baikal, Barguſik, Lena, and ſeveral others in Siberia.

11 Salt lakes and ſprings. In this country are not only a great number of freſh water lakes, but likewiſe ſeveral whoſe waters are ſalt; and theſe reciprocally change their nature, the ſalt ſometimes becoming freſh, and the freſh changing into ſaline. Some lakes alſo dry up, and others appear where none were ever ſeen before. The ſalt lake of Yamuſha, in the province of Tobolſk, is the moſt remarkable of all, for it contains a ſalt as white as ſnow, conſiſting entirely of cubic cryſtals. One finds alſo in Siberia ſaline ſprings, ſalt water brooks, and a hill of ſalt.

12 Curioſities. Siberia affords many other things which deſerve notice. That uſeful root called rhubarb grows in vaſt quantities near the city of Seleginſk. The curious mammuth's bones and horns, as they are called, which are found along the banks of the Oby, Jeneſei, Lena, and Irtiſh, are unqueſtionably the teeth and bones of elephants. But whether theſe elephants teeth and bones were conveyed to theſe northern regions by the general deluge, or by any other inundation, and were by degrees covered with earth, is a point which might lead us into long and very fruitleſs diſquiſitions; we ſhall therefore only obſerve, that ſuch bones have likewiſe been found in Ruſſia, and even in ſeveral parts of Germany. A kind of bones of a ſtill larger ſize than theſe have alſo been dug up in Siberia, and ſeem to have belonged to an animal of the ox kind. The horn of the whale called *narwhal* has been found in the earth near the rivers Indigirka and Anadir; and the teeth of another ſpecies of whales, called *wolroſs*, about Anadirſkoi. The latter are larger than the common ſort, which are brought from Greenland, Archangel, and Kola.

13 Mountains. The chain of Siberian mountains reaches from that of Werchoturie towards the ſouth as far as the neighbourhood of the city of Orienburg, in a continued ridge, under the name of the Uralian mountains; but from thence it alters its direction weſtward. Theſe mountains are a kind of boundary between Ruſſia Proper and Siberia. Another chain of hills divides Siberia from the country of the Calmucks and Mongolians.—Theſe mountains, between the rivers Irtiſh and Oby, are called the Altaic or Golden Mountains, which name they afterwards loſe, particularly between the river Jeneſei and the Baikal lake, where they are called the Sayanian mountains. Siberia | Sibyls.

The inhabitants of Siberia conſiſt of the Aborigines or ancient inhabitants, the Tartars, and Ruſſians, computed at 3,500,000. 14 Inhabitants.

Some of theſe nations have no other religion but that of nature; others are Pagans or Mahometans, and ſome of them have been converted to Chriſtianity, or rather only baptiſed by the Ruſſian miſſionaries.

SIBTHORPIA, a genus of plants belonging to the claſs of didynamia, and to the order of angioſpermia; and in the natural ſyſtem claſſed with thoſe the order of which is doubtful. See BOTANY *Index*.

SIBYLS, in pagan antiquity, certain women ſaid to have been endowed with a prophetic ſpirit, and to have delivered oracles, ſhowing the fates and revolutions of kingdoms. Their number is unknown. Plato ſpeaks of one, others of two, Pliny of three, Ælian of four, and Varro of ten; an opinion which is univerſally adopted by the learned. Theſe ten Sibyls generally reſided in the followed places, Perſia, Libya, Delphi, Cumæ in Italy, Erythræa, Samos, Cumæ in Æolia, Marpeſſa on the Helleſpont, Ancyra in Phrygia, and Tiburtis. The moſt celebrated of the Sibyls is that of Cumæ in Italy, whom ſome have called by the different names of Amalthæa, Demiphile, Herophile, Daphne, Manto, Phemonoe, and Deiphobe. It is ſaid, that Apollo became enamoured of her, and that to make her ſenſible of his paſſion he offered to give her whatever ſhe ſhould aſk. The Sibyl demanded to live as many years as ſhe had grains of ſand in her hand, but unfortunately forgot to aſk for the enjoyment of the health, vigour, and bloom, of which ſhe was then in poſſeſſion. The god granted her requeſt, but ſhe refuſed to gratify the paſſion of her lover though he offered her perpetual youth and beauty. Some time after ſhe became old and decrepit, her form decayed, melancholy paleneſs and haggard looks ſucceeded to bloom and cheerfulneſs. She had already lived about 700 years when Æneas came to Italy, and, as ſome have imagined, ſhe had three centuries more to live before her years were as numerous as the grains of ſand which ſhe had in her hand. She gave Æneas inſtructions how to find his father in the infernal regions, and even conducted him to the entrance of hell. It was uſual for the Sibyl to write her prophecies on leaves, which ſhe placed at the entrance of her cave; and it required particular care in ſuch as conſulted her to take up theſe leaves before they were diſperſed by the wind, as their meaning then became incomprehenſible. According to the moſt authentic hiſtorians of the Roman republic, one of the Sibyls came to the palace of Tarquin the Second, with nine volumes, which ſhe offered to ſell for a very high price. The monarch diſregarded her, and ſhe immediately diſappeared, and ſoon after returned, when ſhe had burned three of the volumes. She aſked the ſame price for the remaining ſix books; and when Tarquin refuſed to buy them, ſhe burned three more, and ſtill perſiſted in demanding the ſame ſum of money for the three that were left.—This extraordinary behaviour aſtoniſhed Tarquin; he bought the books, and the Sibyl inſtantly vaniſhed, and never after appeared to the world. Theſe books were preſerved with great care by the monarch, and called the Sibylline verſes. A college of prieſts was appointed to have the care of them; and ſuch reverence did the Romans

Lempriere's Dictionary.

Sibyls
||
Sicily.

Romans entertain for theſe prophetic books, that they were conſulted with the greateſt ſolemnity, and only when the ſtate ſeemed to be in danger. When the capitol was burnt in the troubles of Sylla, the Sibylline verſes which were depoſited there periſhed in the conflagration; and to repair the loſs which the republic ſeemed to have ſuſtained, commiſſioners were immediately ſent to different parts of Greece to collect whatever verſes could be found of the inſpired writings of the Sibyls. The fate of theſe Sibylline verſes which were collected after the conflagration of the capitol is unknown. There are now many Sibylline verſes extant, but they are reckoned univerſally ſpurious; and it is evident that they were compoſed in the ſecond century by ſome of the followers of Chriſtianity, who wiſhed to convince the heathens of their error, by aſſiſting the cauſe of truth with the arms of pious artifice.

SICERA, a name given to any inebriating liquor by the Helleniſtic Jews. St Chryſoſtom, Theodoret, and Theophilus of Antioch, who were Syrians, and who therefore ought to know the ſignification and nature of "ſicera," aſſure us, that it properly ſignifies palm-wine. Pliny acknowledges, that the wine of the palm tree was very well known through all the eaſt, and that it was made by taking a buſhel of the dates of the palm-tree, and throwing them into three gallons of water; then ſqueezing out the juice, it would intoxicate like wine. The wine of the palm tree is white: when it is drunk new, it has the taſte of the cocoa, and is ſweet as honey. When it is kept longer, it grows ſtrong, and intoxicates. After long keeping, it becomes vinegar.

SICILIAN, in *Muſic*, denotes a kind of gay ſprightly air, or dance, probably invented in Sicily, ſomewhat of the nature of an Engliſh jig; uſually marked with the characters $\frac{6}{8}$, or $\frac{12}{8}$. It conſiſts of two ſtrains; the firſt of four, and the ſecond of eight, bars or meaſures.

1
Boundaries and extent.

SICILY, is a large iſland in the Mediterranean ſea, adjoining to the ſouthern extremity of Italy, and extends from latitude 36° 25′ to latitude 38° 25′, and from longitude 12° 50′ to longitude 16° 5′ eaſt from London. Its greateſt length 210 miles, breadth 133, circumference 600; its form triangular, the three angles being the promontories of Pelorum, Pachynum, and Lilybæum, or as they are now called the Faro, Capo Paſſaro, and Capo Boco. It is divided from Italy by the ſtraits of Meſſina, reaching from the Tower of Faro, which is the moſt northerly part of the iſland, to the *Capo dell' Armi*, or the Cape of Arms, the moſt ſouthern part of Calabria. Theſe ſtraits, by the Latins called *Fretum Siculum*, by the Italians *Il Faro di Meſſina*, and by us the *Faro of Meſſina*, are between 12 and 15 miles over in the broadeſt places, and in the narroweſt about a mile and an half; inſomuch that when Meſſina was taken by the Carthaginians, many of the inhabitants are ſaid to have ſaved themſelves by ſwimming to the oppoſite coaſt of Italy. Hence has ariſen an opinion that the iſland of Sicily was originally joined to the continent, but afterwards ſeparated by an earthquake or ſome other natural cauſe. This ſeparation, however, is reckoned by the moſt judicious among the ancients to be fabulous; and they content themſelves with ſpeaking of it as a thing ſaid to have happened.

2
Hiſtory during the fabulous ages.

Anciently this iſland was called *Sicania*, *Sicilia*, and *Trinacria* or *Triquetra*; the two former it had from the Sicani and Siculi, who peopled a conſiderable part of the country; the two latter from its triangular figure. Its firſt inhabitants, according to the moſt reſpectable ancient authors, were the Cyclopes and Læſtrigones, who are ſaid to have ſettled in the countries adjoining to Mount Etna; but of their origin we know nothing, except what is related by the poets. After them came the Sicani, who called themſelves the original inhabitants of the country; but ſeveral ancient hiſtorians inform us that they came from a country in Spain watered by the river Siconus. Diodorus, however, is of opinion, that the Sicani were the moſt ancient inhabitants of this iſland. He tells us that they were in poſſeſſion of the whole, and applied themſelves to cultivate and improve the ground in the neighbourhood of Etna, which was the moſt fruitful part of the iſland: they built ſeveral ſmall towns and villages on the hills to ſecure themſelves againſt thieves and robbers; and were governed, not by one prince, but each city and diſtrict by its own king. Thus they lived till Etna began to throw out flames, and forced them to retire to the weſtern parts of the iſland, which they continued to inhabit in the time of Thucydides. Some Trojans, after the deſtruction of their city, landed in the iſland, ſettled among the Sicani, and built the cities of Eryx and Egeſta, uniting themſelves with them, and taking the general name of Elymi or Elymæi. They were afterwards joined by ſome Phocenſes, who ſettled here on their return from the ſiege of Troy. Sicily.

After the Sicani had for many ages enjoyed an undiſturbed poſſeſſion of the whole of Sicily, or ſuch parts of it as they choſe to inhabit, they were viſited by the Siculi, who were the ancient inhabitants of Auſonia properly ſo called; but being driven out from thence by the Opici, they took refuge in the iſland of Sicily. Not being contented with the narrow bounds allowed them by the Sicani, they began to encroach upon their neighbours; upon which a war enſuing, the Sicani were utterly defeated, and confined to a corner of the iſland, the name of which was now changed from *Sicania* into that of *Sicilia*.

About 300 years after the arrival of the Siculi, the iſland firſt began to be known to the Greeks, who eſtabliſhed various colonies, and built many cities in different parts of the iſland; and it is only from the time of their arrival that we have any hiſtory of the iſland. The firſt of the Greeks that came into Sicily were the Chalcidians of Eubœa, under the conduct of Thucles, who built Naxus, and a famous altar of Apollo, which, as Thucydides tells us, was ſtill ſtanding in his time without the city. The year after, which was, according to Dionyſius Halicarnaſſenſis, the third of the 17th Olympiad, Archias the Corinthian, one of the Heraclidæ, laid the foundations of Syracuſe. Seven years after, a new colony of Chalcidians founded Leontini and Catana, after having driven out the Siculi, who inhabited that tract. About the ſame time Lamis, with a colony from Megara, a city of Achaia, ſettled on the river Pantacius, at a place called *Trotilum*, where his adventurers lived ſome time in common with the Chalcidians of Leontini; but, being driven from thence by the Leontines, he built the city of Thapſus, where he died. Upon his death, the colony left Thapſus; and under the conduct of Hyblon king of the Siculi, founded Megara Hyblæa, where they reſided 245 years, till

they

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they were driven out by Gelon tyrant of Syracuſe. During their abode at Megara, they ſent one Pamilus, who was come from Megara in Achaia, their original city, to build Selinus. This city was founded about 100 years after the foundation of Megara. Antiphemus and Entimus, the former a Rhodian, the other a Cretan, led each a colony of their countrymen, and jointly built the city of Gela on a river of the ſame name, eſtabliſhing in their new ſettlement the Doric cuſtoms, about 45 years after the founding of Syracuſe. The inhabitants of Gela founded Agrigentum 108 years after their arrival in Sicily, and introduced the ſame cuſtoms there. A few years after, Zancle was built by the pirates of Cumæ in Italy; but chiefly peopled by the Chalcidians, Samians, and Ionians, who choſe rather to ſeek new ſettlements than live under the Perſian yoke. Some time after, Anaxales, tyrant of Rhegium, drove out the ancient proprietors; and, dividing his lands amongſt his followers, called the city *Meſſana* or *Meſſene*, which was the name of his native city in Peloponneſus. The city of Himera was founded by the Zancleans under the direction of Eucleides, Simus, and Sacon; but peopled by the Chalcidians and ſome Syracuſan exiles, who had been driven out by the contrary faction.

The Syracuſans built Acræ, Chaſmenæ, and Camarina; the firſt 70 years, the ſecond 90, and the third 135, after the foundation of their own city. This is the account which Thucydides, a moſt judicious and exact writer, gives us of the various nations, whether Greeks or Barbarians, who ſettled in Sicily. Strabo counts among the ancient inhabitants of Sicily the Morgetes, who being driven out of Italy by the Oenotrians, ſettled in that part of the iſland where the ancient city of Morgantium ſtood. The Campani, who aſſumed the name of *Mamertini*, that is, *invincible warriors*, and the Carthaginians, who ſettled very early in Sicily, ought likewiſe to be counted among the ancient inhabitants of the iſland.

Before this period the hiſtory of Sicily is blended with fables like the early hiſtory of almoſt every other country. After the ſettlement of the Greeks in the iſland, its various revolutions have been traced from their ſeveral ſources by many writers; but by none with greater accuracy than Mr Swinburne. From his account of his Travels in the Two Sicilies, we have therefore taken the following conciſe hiſtory of this kingdom, which will at once gratify ſuch of our readers as intereſt themſelves in the fate of a generous people who long ſtruggled in vain for freedom; and at the ſame time afford them a ſpecimen of the entertainment they may receive from the very elegant work of the author.

Swinburne's Travels in the Two Sicilies, vol. ii. p. 176.

3 Grecian colonies in Sicily.

"Ariſtocracy prevailed at firſt in the Greek ſettlements, but ſoon made way for tyranny; which in its turn was expelled by democracy. One of the earlieſt deſtroyers of common liberty was Phalaris of Agrigentum, who reigned 600 years before Chriſt: his example was contagious; a legion of tyrants ſprung up, and not a commonwealth in the iſland eſcaped the laſh of an uſurper. Syracuſe was moſt oppreſſed and torn to pieces by diſſenſion; as its wealth and preponderance in the general ſcale held out a greater temptation than other cities to the ambition of wicked men. It requires the combined teſtimony of hiſtorians to enforce our belief of its wonderful proſperity, and the no leſs extraordinary tyranny of ſome of its ſovereigns. Theſe Grecian colonies attained to ſuch excellence in arts and ſciences as emboldened them frequently to vie with the learned and ingenious in the mother country; nay, often enabled them to bear away the palm of victory: there needs no ſtronger proof of their literary merits than a bare recital of the names of Archimedes, Theocritus, Gorgias, and Charondas.

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"But the Sicilian Greeks were not deſtined to enjoy the ſweets of their ſituation without moleſtation. Very ſoon after their arrival, the inhabitants of the neighbouring coaſt of Africa began to aſpire to a ſhare of Sicily. Carthage ſent large bodies of forces at different times to eſtabliſh their power in the iſland, and about 500 years before the Chriſtan era had made themſelves maſters of all the weſtern parts of it. The Siculi retained poſſeſſion of the midland country, and the ſouthern and eaſtern coaſts were inhabited by the Greeks.

4 Carthaginians conquer great part of it.

"About that time Gelo was choſen prince of Syracuſe on account of his virtues, which grew ſtill more conſpicuous after his exaltation: had the example he ſet been followed by his ſucceſſors, the advantages of freedom would never have been known or wiſhed for by the Syracuſans. The Carthaginians found in him a vigorous opponent to their project of enſlaving Sicily, a project invariably purſued but never accompliſhed.

5 Gelo choſen king.

"Hiero ſucceeded his brother Gelo, and, contrary to the uſual progreſſion, began his reign by a diſplay of bad qualities. Senſible of his error, and improved by experience, he afterwards adopted more equitable meaſures. At his death the Syracuſans threw off the yoke, and for ſixty years revelled in all the joys of freedom. Their peace was, however, diſturbed by the Athenians and the Carthaginians. The latter plundered Agrigentum, and threatened ruin to the reſt of the Grecian ſtates; but a treaty of peace averted that ſtorm. The Athenians, under pretence of ſupporting their allies the people of Segeſta, but in reality from a thirſt of dominion, inveſted Syracuſe with a formidable land and naval armament under the command of Nicias; in conſequence of a raſh indigeſted plan, ill conducted attacks, and inadequate ſupplies, their whole hoſt was cut to pieces or led away into captivity.

6 Is ſucceeded by Hiero.

"Syracuſe had ſcarcely time to breathe after her victory ere inteſtine wars broke out, and raiſed Dionyſius to ſupreme command. Avarice, deſpotiſm, and cruelty, marked every day of his reign; but his military enterpriſes were crowned with conſtant ſucceſs. He died in peace, and bequeathed a powerful ſovereignty to a ſon of his name tainted with the ſame and worſe vices, but not endowed with equal capacity and martial ability: in ſuch hands the rod of tyranny ceaſed to be formidable, and the tyrant was driven out of Sicily by the patriotic party; but matters were not ſufficiently ſettled for popular government, and Dionyſius reſumed the ſceptre for a while, till Timoleon forced him into perpetual exile."

7 Dionyſius the elder and younger.

Liberty ſeemed now to be eſtabliſhed on a permanent baſis; but in Syracuſe ſuch proſpects always proved illuſory. Agathocles, a tyrant more inhuman than any preceding uſurper, ſeized the throne, and deluged the country with blood. He was involved in a perilous conteſt with the Carthaginians, who obtained many advantages

8 Agathocles the tyrant.

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vantages over him, drove his troops from poſt to poſt, and at laſt blocked up his capital. In this deſperate ſituation, when all foreign helps were precluded, and hardly a reſource remained at home, the genius of Agathocles compaſſed his deliverance by a plan that was imitated among the ancients by Hannibal, and among the moderns by the famous Cortes. He embarked with the flower of his army; forced his way through innumerable obſtacles; landed in Africa; and, having burnt his fleet, routed the Carthaginians in a pitched battle, and laid their territory waſte. Carthage ſeemed to be on the brink of ruin, and that hour might have marked her downfal had the Sicilian hoſt been compoſed of patriotic ſoldiers, and not of ungovernable aſſaſſins; diſcord pervaded the victorious camp, murder and riot enſued; and the tyrant, after beholding his children and friends butchered before his face, eſcaped to Sicily, to meet a death as tragical as his crimes deſerved.

9 Pyrrhus king of Epirus deceives the Sicilians.

Anarchy now raged throughout the iſland, and every faction was reduced to the neceſſity of calling in the aſſiſtance of foreign powers; among whom Pyrrhus king of Epirus took the lead, and reduced all parties to ſome degree of order and obedience. But ambition ſoon prompted him to invade thoſe rights which he came to defend; he caſt off the maſk, and made Sicily feel under his ſway as heavy a hand as that of its former oppreſſors; but the Sicilians ſoon aſſumed courage and ſtrength enough to drive him out of the iſland.

10 The Mamertini ſurpriſe Meſſina, and are aſſiſted by the Romans;

About this period the Mamertini, whom Mr Swinburne indignantly ſtyles a crew of miſcreants, ſurpriſed Meſſina, and, after a general maſſacre of the citizens, eſtabliſhed a republican form of government. Their commonwealth became ſo troubleſome a neighbour to the Greeks, that Hiero II. who had been raiſed to the chief command at Syracuſe in conſideration of his ſuperior wiſdom and warlike talents, found himſelf neceſſitated to form a league with Carthage, in order to deſtroy this neſt of villains. In their diſtreſs the Mamertini implored the aſſiſtance of Rome, though the ſenate had recently puniſhed with exemplary ſeverity one of their own legions for a ſimilar outrage committed at Rhegium. The virtue of the Romans gave way to the temptation, and the deſire of extending their empire beyond the limits of Italy, caſt a veil over every odious circumſtance attending this alliance. A Roman army croſſed the Faro, relieved Meſſina, defeated the Carthaginians, and humbled Hiero into an ally of the republic.

11 which gives riſe to the firſt Punic war.

Thus began the firſt Punic war, which was carried on for many years in Sicily with various ſucceſs. The genius of Hamilcar Barcas ſupported the African cauſe under numberleſs diſappointments, and the repeated overthrows of his colleagues; at laſt, finding his exertions ineffectual, he adviſed the Carthaginian rulers to purchaſe peace at the price of Sicily. Such a treaty was not likely to be obſerved longer than want of ſtrength ſhould curb the animoſity of the vanquiſhed party: when their vigour was recruited, Hannibal ſon of Hamilcar eaſily perſuaded them to reſume the conteſt, and for 16 years waged war in the heart of the Roman territories. Meanwhile Hiero conducted himſelf with ſo much prudence, that he retained the friendſhip of both parties, and preſerved his portion of Sicily in perfect tranquillity. He died in extreme old age, beloved and reſpected both at home and abroad.

12 The ſecond Punic war raiſed by Hannibal.

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His grandſon Hieronymus, forſaking this happy line of politics, and contracting an alliance with Carthage, fell an early victim to the troubles which his own folly had excited. Once more, and for the laſt time, the Syracuſans found themſelves in poſſeſſion of their independence: but the times were no longer ſuited to ſuch a ſyſtem; diſſenſions gained head, and diſtracted the public councils. Carthage could not ſupport them, or prevent Marcellus from undertaking the ſiege of Syracuſe, immortalized by the mechanical efforts of Archimedes, and the immenſity of the plunder. See SYRACUSE.

13 Sicily conquered by the Saracens, and afterwards by the Normans.

The Sicilians after this relinquiſhed all martial ideas, and during a long ſeries of generations turned their attention ſolely to the arts of peace and the labours of agriculture. Their poſition in the centre of the Roman empire preſerved them both from civil and foreign foes, except in two inſtances of a ſervile war. The rapacity of their governors was a more conſtant and inſupportable evil. In this ſtate of apathy and opulence Sicily remained down to the 7th century of our era, when the Saracens began to diſturb its tranquillity. The barbarous nations of the north had before invaded and ravaged its coaſts, but had not long kept poſſeſſion. The Saracens were more fortunate. In 827 they availed themſelves of quarrels among the Sicilians to ſubdue the country. Palermo was choſen for their capital, and the ſtandard of Mahomet triumphed about 200 years. In 1038 George Maniaces was ſent by the Greek emperor with a great army to attack Sicily. He made good his landing, and puſhed his conqueſts with vigour: his ſucceſs aroſe from the valour of ſome Norman troops, which were at that time unemployed and ready to ſell their ſervices to the beſt bidder. Maniaces repaid them with ingratitude; and by his abſurd conduct gave the Muſſelmans time to breathe, and the Normans a pretext and opportunity of invading the Imperial dominions in Italy. Robert and Roger of Hauteville afterwards conquered Sicily on their own account, not as mercenaries; for having ſubſtantially ſettled their power on the continent, they turned their arms againſt this iſland in obedience to the dictates of zeal and ambition. After ten years ſtruggle, the Saracens yielded up the rich prize, and Robert ceded it to his brother Roger, who aſſumed the title of Great Earl of Sicily, ruled the ſtate with wiſdom, and ranks deſervedly among the greateſt characters in hiſtory. He raiſed himſelf from the humble ſtation of a poor younger ſon of a private gentleman, to the exalted dignity of a powerful monarch, by the ſole force of his own genius and courage; he governed a nation of ſtrangers with vigour and juſtice, and tranſmitted his poſſeſſions undiſputed to his poſterity. Such an aſſemblage of great qualities is well intitled to our admiration.

14 Under the dominion of different monarchs.

He was ſucceeded by his ſon Simon, whoſe reign was ſhort, and made way for a ſecond ſon called Roger. In 1127 this prince joined to his Sicilian poſſeſſions the whole inheritance of Robert Guiſcard (ſee NAPLES, N° 23.), and aſſumed the regal ſtyle. The greateſt part of his reign was taken up in quelling revolts in Italy, but Sicily enjoyed profound peace. In 1154 his ſon William aſcended the throne, and paſſed his life in war and confuſion. William II. ſucceeded his father, and died without iſſue. Tancred, though baſely born, was elected his ſucceſſor, and after him his ſon William III. who was vanquiſhed by Henry of Swabia. During the

Sicily. the troubles that agitated the reign of his ſon the emperor Frederic, peace appears to have been the lot of Sicily. A ſhort-lived ſedition, and a revolt of the Saracens, are the only commotions of which we read. For greater ſecurity, the Saracens were removed to Puglia 400 years after the conqueſt of Sicily by their anceſtors. Under Conrad and Manfred Sicily remained quiet; and from that time the hiſtory of Sicily is related under the article NAPLES, N° 20, &c.

15 Is at length conquered by the Spaniards.

At the death of Charles II. of Spain, his ſpoils became an object of furious contention; and at the peace of Utrecht, Sicily was ceded to Victor duke of Savoy, who, not many years after, was forced by the emperor Charles VI. to relinquiſh that fine iſland, and take Sardinia as an equivalent. But as the Spaniards had no concern in theſe bargains, they made a ſudden attempt to recover Sicily, in which they failed through the vigilance of the Engliſh admiral Byng. He deſtroyed their fleet in 1718, and compelled them to drop their ſcheme for a time. In 1734 the Spaniſh court reſumed their deſign with ſucceſs. The infant Don Carlos drove the Germans out, and was crowned king of the two Sicilies at Palermo. When he paſſed into Spain to take poſſeſſion of that crown, he transferred the Sicilian diadem to his ſon Ferdinand III. of Sicily, and IV. of Naples, and it has ever ſince remained in the poſſeſſion of the ſame family.

16 Account of the ſtraits of Meſſina.

Sicily is ſeparated, as we have already obſerved, from Italy by a narrow ſtrait called the *Faro of Meſſina*. This ſtrait is ſtill remarkable for the rapidity of its currents and the irregular ebbing and flowing of the ſea, which ſometimes ruſhes in with ſuch violence as to endanger ſhips riding at anchor. Anciently it was much more remarkable for Scylla and Charybdis, the one a rock, and the other a whirlpool, between which it was very dangerous to ſteer, and concerning which ſo many fables have been related by the ancients. Scylla is a rock on the Italian ſide, oppoſite to Cape Pylores, which runs out into the ſea on the Sicilian ſide. Mr Brydone informs us, that the navigation of the ſtraits is not even yet performed without danger. He alſo informs us, that the noiſe of the current which ſets through the ſtraits may be heard for ſeveral miles, like the roaring of ſome large impetuous river confined between narrow banks. In many places the water roſe into whirlpools and eddies, which are dangerous to ſhipping. The current ſet exactly for the rock of Scylla, and would certainly have carried any thing thrown into it againſt that point. Our author, however, is by no means of opinion that the ſtrait is ſo dangerous as the ancients have repreſented it; though he thinks that the ſtrait is now probably much wider than formerly, which may have diminiſhed the danger. There are many ſmall rocks, which ſhow their heads near the baſe of the large ones. Theſe are probably the dogs deſcribed by the ancient poets as howling round Scylla. The rock is near 200 feet high, and has a kind of caſtle or fort built on its ſummit with a town called *Scylla* or *Sciglio*, containing 300 or 400 inhabitants on its ſouth ſide, which gives the title of prince to a Calabreſe family.

The following account of theſe rocks and whirlpools is given by the celebrated naturaliſt Spallanzani. He informs us, that Scylla is a lofty rock, 12 miles from Meſſina, riſing almoſt perpendicular from the ſea on the ſhore of Calabria, beyond which is the ſmall city of the ſame name. Though there was ſcarcely any wind, Spallanzani heard, about two miles diſtant from the rock, a noiſe like a confuſed barking of dogs, and on a nearer approach he diſcovered the cauſe. This rock contains a number of caverns, one of the largeſt of which is called by the people *D agara*. The waves, when in the leaſt agitated, ruſhing into theſe caverns, break, daſh, throw up frothy bubbles, and thus occaſion theſe various and multiplied ſounds. He then perceived with how much truth and reſemblance of nature Homer and Virgil, in their perſonifications of Scylla, had pourtrayed this ſcene, by deſcribing the monſter they drew as lurking in the darkneſs of a vaſt cavern, ſurrounded by ravenous barking maſtiffs, together with wolves, to increaſe the horror. Sicily.

Though the tide is almoſt imperceptible in the open parts of the Mediterranean, it is very ſtrong in the ſtrait of Meſſina, owing to the narrowneſs of the channel, and regulated by the periodical elevations and depreſſions of the water. Where the current is accompanied by a wind blowing the ſame way, veſſels have nothing to fear, ſince they either do not enter the ſtrait, both the wind and ſtream oppoſing them; or, if both are favourable, enter on full ſail, and paſs with ſuch rapidity that they ſeem to fly over the water. When the current runs from ſouth to north, and the north wind blows hard at the ſame time, the ſhip is reſiſted by the oppoſite current, and impelled by two forces in contrary directions, is daſhed on the rock of Scylla, or driven on the neighbouring ſands. The current, where it is ſtrongeſt, does not extend over the whole ſtrait, but winds through it in intricate meanders, with the courſe of which the ſailors ſtationed to give ſtrangers aſſiſtance are well acquainted, and thus able to guide the ſhip in ſuch a manner as to avoid it. Should the pilot, however, confiding in his own ſkill, neglect ſuch aſſiſtance, he would run the moſt imminent riſk of being ſhipwrecked. In this conflict of the waters, it is uſeleſs to throw the line to diſcover the depth of the bottom, the violence of the current frequently carrying the lead almoſt on the ſurface of the water. The ſtrongeſt cables, though ſome feet in circumference, break like ſmall cords. Every expedient afforded by the art of navigation, is uſeleſs here. The only means of avoiding being daſhed againſt the rocks, or driven upon the ſands in the midſt of this perilous conteſt of the winds and waves, is to have recourſe to the ſkill and courage of the Meſſineſe ſeamen.

Charybdis is diſtant from the ſhore of Meſſina about 750 feet, and is called by the people of the country *Calofaro*, not from the agitation of the waves, but from καλος and φαρος, *beautiful tower*, from the lighthouſe erected near it for the guidance of veſſels. When the current ſets in from the north, the pilots call it the *deſcending rema*, or current; and when it runs from the ſouth, the *aſcending rema*. The current aſcends or deſcends at the riſing or ſetting of the moon, and continues for ſix hours. In the interval between each aſcent or deſcent, there is a calm which laſts at leaſt 15 minutes, but not longer than an hour. Afterwards, at the riſing or ſetting of the moon, the current enters from the north, making various angles of incidence with the ſhore, and at laſt reaches the Calofaro. This delay ſometimes continues

Sicily. continues two hours; ſometimes it immediately falls into the Calofaro; and then experience regards it as a certain indication of bad weather.

When Spallanzani obſerved Charybdis from the ſhore, it appeared like a group of tumultuous waters, which group as he approached, became more extenſive and more agitated. He was carried to the edge, where he ſtopped ſome time to make the requiſite obſervations; and was then convinced beyond the ſhadow of a doubt, that what he ſaw was by no means a vortex or whirlpool.

Though he was convinced that there was no gulf under the Calofaro, as otherwiſe there would have been a whirlpool, which would have carried down into it the floating ſubſtances; he determined to ſound the bottom with a plummet, and found its greateſt depth did not exceed 500 feet. He was alſo informed, to his great ſurpriſe, that beyond the Calofaro, towards the middle of the ſtrait, the depth was double.

When the wind and current are contrary to each other, and both in their greateſt violence, the ſwelling and daſhing of the waves within the Calofaro is much ſtronger, more impetuous, and more extenſive. It then contains three or four ſmall whirlpools, or even more, according to the greatneſs of its extent and violence. If at this time ſmall veſſels are driven into the Calofaro by the current or the wind, they are ſeen to whirl round, rock, and plunge, but are never drawn down into the vortex. They only ſink when filled with water, by the waves beating over them. When veſſels of a larger ſize are forced into it, whatever wind they have they cannot extricate themſelves; their ſails are uſeleſs; and after having been for ſome time toſſed about by the waves, if they are not aſſiſted by the pilots of the country, who know how to bring them out of the courſe of the current, they are furiouſly driven upon the neighbouring ſhore of the Lanterna, where they are wrecked, and the greater part of their crews periſh in the waves.

If a ſhip be extricated from the fury of Charybdis, and carried by a ſtrong ſoutherly wind along the ſtrait towards the northern entrance, it will indeed paſs out ſafely; but ſhould it meet with a wind in a nearly oppoſite direction, it would become the ſport of both theſe winds, and, unable to advance or recede, be driven in a middle courſe between their two directions, that is to ſay, full upon the rock of Scylla, if it be not immediately aſſiſted by the pilots. It is likewiſe obſerved, that in theſe hurricanes a land wind frequently riſes, which deſcends from a narrow paſs in Calabria, and increaſes the force with which the ſhip is impelled towards the rock. Thus, the ſaying which became proverbial among the ancients;—that "he who endeavours to avoid Charybdis, daſhes upon Scylla," is, in a great meaſure, true.

In the ſtraits, Mr Brydone informs us, a moſt ſurpriſing phenomenon is to be obſerved. In the heat of ſummer, after the ſea and air have been much agitated, there appears in the heavens over the ſtraits a great variety of ſingular forms, ſome at reſt and others moving with great velocity. Theſe forms, in proportion as the light increaſes, ſeem to become more aerial, till at laſt, ſome time before ſunriſe, they totally diſappear. The Sicilians repreſent this as the moſt beautiful ſight in nature. Leonti, one of the beſt Sicilian writers, ſays, that the heavens appear crowded with a variety of objects, ſuch as palaces, woods, gardens, &c. beſides the figures of men and other animals that are ſeen in motion among them. Some treatiſes have been written concerning this phenomenon; but nothing ſatisfactory has been delivered concerning its cauſe. Sicily.

17 Climate and produce.

Though Sicily lies in a warm climate, the air is healthful, being refreſhed with ſea-breezes on every ſide. It has at all times been remarkably fertile; but the era of its greateſt proſperity was from the ſiege of Syracuſe by the Athenians to the Carthaginian conqueſts. Then and long after it ſupplied with grain, in years of ſcarcity, all the countries upon the Mediterranean except Egypt and the coaſts of Aſia, and Rome and Carthage continually. Even now, under all the impediments of ſuperſtition and bad government, its productions are, in quantity and quality, the beſt in Europe. Of the vegetable are grain, wines, oil, fruits, tobacco, mulberry trees for the ſilkworm, cotton, medicinal roots, and ſugar canes. The laſt of theſe flouriſh near Avola and Merilli. They are of an inferior quality to thoſe of the Weſt Indies, but their ſugar is ſweeter than any other. The animal production is ſimilar to that of Italy, but the horned cattle are a ſmaller breed. The coaſts abound with fiſh, particularly with tunney and anchovies; the export of which forms a very lucrative branch of commerce. There are mines of ſilver, copper, and lead, but none are worked. Near Palma are beds of the beſt ſulphur; at the mouth of the river Giaretta is found a yellow amber, preferable to that of the Baltic: and in every part of the iſland quarries of marbles, that have furniſhed materials for all the noble edifices of Sicily. The moſt beautiful are in the neighbourhood of Palermo, particularly the yellow, and thoſe that reſemble the verde antique, porphyry, and lapis lazuli. The population of the iſland amounts to 1,300,000 ſouls; not as much again as the ſingle city of Syracuſe formerly contained.

Watkin's Travels through Switzerland, Italy, Sicily, &c.

18 Rivers and mountains.

Here are ſeveral rivers and good ſprings; but few of the rivers are navigable, having but a ſhort courſe, and deſcending precipitately from the mountains. The chief are the Bantera, the Jaretta, and the Salſo; of which, the two former run from weſt to eaſt, and the third from north to ſouth.

Of the mountains in this iſland the moſt noted is Mount Etna, now called *Monte Gibello*, or *Mongibello*, a volcano whoſe eruptions have often proved fatal to the neighbouring country. See ETNA.

19 Conſtitution and government.

Were the Sicilians a cultivated people, among whom thoſe arts were encouraged which not only promote the wealth and comfort of a nation, but alſo exerciſe the nobler faculties and extend the views of mankind, the circumſtances of their government are ſuch, that it might gradually be improved into a free conſtitution: but to this, the ignorance, ſuperſtition, and poverty, of the people ſeem to be invincible obſtacles. The monarchical power in Sicily is far from being abſolute; and the parliament claims a ſhare of public authority independently of the will of the king, deduced from a compact made between Roger and the Norman barons after the expulſion of the Saracens. This claim is denied by the king, who wiſhes the nobles to conſider their privileges as derived ſolely from his favour. Hence the government is in a ſituation which greatly reſembles that of our own and the other kingdoms of Europe in the feudal times; there are continual jealouſies and oppoſitions between the king and the barons, of which an enlightened people might eaſily take advantage, and obtain that ſhare in the conſtitution which might ſecure them

Munter's Memoirs relative to Naples and Sicily.

Sicily. them from future oppreſſion. In theſe diſputes, the king has the advantage at leaſt of power if not of right; and ſeveral works, in which the claims of the Sicilian barons have been aſſerted, were publicly burned not many years ago.

As the ſovereign holds his court at Naples, Sicily is governed by a viceroy, who is appointed only for three years, though at the end of that term his commiſſion is ſometimes renewed. He lives in great ſtate, and, as the repreſentative of the king, his power is very conſiderable. He preſides in all the courts and departments of government, and is commander in chief of all the forces: he calls or diſſolves the parliament when he pleaſes; and by him all orders, laws, and ſentences, muſt be ſigned: but his office is far from being deſirable, as it generally renders him the object either of the jealouſy of the court of Naples, or of the hatred of the Sicilians.

The parliament conſiſts of the nobles, the biſhops, and abbots, and the repreſentatives of 43 cities, which are immediately ſubject to the crown. Thoſe cities which are ſubject to any of the nobles ſend no members to the parliament; in theſe the king has not much authority, and derives little advantage from them. According to the laws, the parliament ought to be aſſembled at the end of every three years: but the government pays little attention to this rule. The common people are in general very much attached to the nobles, and are inclined to take their part in all their differences with the court: but the magiſtrates and principal inhabitants of the cities which belong to theſe feudal lords, wiſh to get rid of their authority, and imagine that they ſhould be leſs oppreſſed, if immediately ſubject to the king: theſe inclinations are not diſagreeable to the court, and are encouraged by moſt of the lawyers, who are of great ſervice to government in conteſting the privileges of the nobles. Many of theſe privileges are now abridged; and the power of the barons, with reſpect to the adminiſtration of juſtice in their domains, was very properly limited by the viceroy Caraccioli, in the year 1785. The government of this nobleman was very beneficial to Sicily, as he, in a great meaſure, cleared the iſland of the banditti that uſed to infeſt it, and made ſeveral excellent regulations for the eſtabliſhment of ſocial order and perſonal ſecurity. He

20 Inquiſition. deſerves the thanks of every well-wiſher to mankind for having aboliſhed the court of inquiſition, which had been eſtabliſhed in this country by Ferdinand the Catholic, and made dependent on the authority of the grand inquiſitor of Spain. Its laſt *auto da fe* was held in the year 1724, when two perſons were burned. At length Charles III. rendered it independent of the Spaniſh inquiſitor, and abridged its power, by forbidding it to make uſe of the torture, and to inflict public puniſhments. The Marcheſe Squillace, and his ſucceſſor the Marcheſe Tanucci, were both enemies to the hierarchy; and, during their viceroyalties, took care to appoint ſenſible and liberal men to the office of inquiſitor: the laſt of whom was Ventimiglia, a man of a moſt humane and amiable character, who heartily wiſhed for the abolition of this diabolical court, and readily contributed toward it. While he held the office of inquiſitor, he always endeavoured to procure the acquittal of the accuſed; and when he could ſucceed no other way, would pretend ſome informality in the trial. The total annihilation of this inſtrument of the worſt of tyranny was reſerved for Caraccioli. A prieſt being accuſed to the inquiſition, was dragged out of his houſe and thrown into the dungeon. He was condemned; but, on account of informality, and a violation of juſtice in the trial, he appealed to the viceroy, who appointed a committee of juriſts to examine the proceſs. The inquiſitor refuſed to acknowledge the authority of this commiſſion; pretending that to expoſe the ſecrets of the holy office, and to ſubmit its deciſions to the examination of lay judges, would be ſo inconſiſtent with his duty, that he would ſee the inquiſition aboliſhed rather than conſent to it. Caracci- 21 aboliſhed oli took him at his word, and procured a royal mandate by Caracby which the holy office was at once annihilated. He cioli. aſſembled all the nobility, judges, and biſhops, on the 27th of March 1782, in the palace of the inquiſition, and commanded the king's order to be read; after which he took poſſeſſion of the archives, and cauſed all the priſons to be ſet open: in theſe were at that time only two priſoners, who had been condemned to perpetual confinement for witchcraft. The papers relating to the finances were preſerved; but all the reſt were publicly burned. The poſſeſſions of the holy office were aſſigned to the uſe of churches and charitable inſtitutions: but the officers then belonging to it retained their ſalaries during their lives. The palace itſelf is converted into a cuſtomhouſe, and the place where heretics were formerly roaſted alive for the honour of the Catholic faith, is now changed into a public garden. The cognizance of offences againſt orthodoxy is committed to the biſhops: but they cannot cite any one to appear before them without permiſſion from the viceroy; neither can they confine any perſon to a ſolitary priſon, nor deny him the privilege of writing to his friends, and converſing freely with his advocate. The nobility are ſo numerous in this iſland, that Labat ſays it is paved with noblemen. The general aſſembly of parliament is compoſed of 66 archbiſhops, biſhops, abbots, and priors, which form the Bracchio eccleſiaſtico. Fifty-eight princes, 27 dukes, 37 marquiſſes, 27 counts, one viſcount, and 79 barons, form the militaire; and the demaniale conſiſts of 43 repreſentatives of free towns. Out of each bracchio four deputies are choſen to conduct public buſineſs. But the viceroy, the prince of Butera, and the prætor of Palermo, are always the three firſt. Such was the government of Sicily while the Neapolitan monarchy remained entire; but ſince the latter was uſurped by the French, Sicily is all that is left to its former poſſeſſor.

Sicily || Sida.

SICINIUS DENTATUS, a tribune of the people, lived a little after the expulſion of the kings from Rome. He was in 120 battles and ſkirmiſhes, beſides ſingle combats, in all of which he came off conqueror. He ſerved under nine generals, all of whom triumphed by his means. In theſe battles he received 45 wounds in the forepart of his body, and not one in his back. The ſenate made him great preſents, and he was honoured with the name of the Roman Achilles.

SICYOS, a genus of plants belonging to the claſs of monœcia, and to the order of ſyngeneſia; and in the natural ſyſtem arranged under the 34th order, *Cucurbitaceæ*. See BOTANY *Index*.

SIDA, *Yellow* or *Indian* MALLOW, a genus of plants belonging to the claſs of monadelphia, and to the order of polyandria; and in the natural ſyſtem ranging under the 37th order, *Columniferæ*. See BOTANY *Index*.

SIDDEE,

Siddee || Sidney.

SIDDEE, or SEDEE, an Arabic title, by which the Abyſſinians or Habaſhys are always diſtinguiſhed in the courts of Hindoſtan; where, being in great repute for firmneſs and fidelity, they are generally employed as commanders of forts or in poſts of great truſt.

SIDEREAL YEAR. See *ASTRONOMY Index*.

SIDERIA, in *Natural Hiſtory*, the old name of a genus of cryſtals, uſed to expreſs thoſe altered in their figure by particles of iron. Theſe are of a rhomboidal figure, and compoſed only of ſix planes. Of this genus there are four known ſpecies. 1. A colourleſs, pellucid, and thin one; found in conſiderable quantities among the iron ores of the foreſt of Dean in Glouceſterſhire, and in ſeveral other places. 2. A dull, thick, and brown one; not uncommon in the ſame places with the former. And, 3. A black and very gloſſy kind, a foſſil of great beauty; found in the ſame place with the others, as alſo in Leiceſterſhire and Suſſex.

SIDERITE, a ſubſtance ſuppoſed by Meyer to be a new metal; but according to Bergman and Kirwan it is nothing elſe than a natural combination of phoſphoric acid with iron.

SIDERITIS, IRONWORT; a genus of plants belonging to the claſs of didynamia, and to the order of gymnoſpermia; and in the natural ſyſtem ranging under the 42d order *Verticillatæ*. See BOTANY *Index*.

SIDEROXYLON, IRON-WOOD; a genus of plants belonging to the claſs of pentandria, and to the order of monogynia; and in the natural ſyſtem ranging under the 53d order, *Dumoſæ*. See BOTANY *Index*.

SIDNEY, SIR PHILIP, was born, as is ſuppoſed, at Penſhurſt in Kent in the year 1554: His father was Sir Henry Sidney, an Iriſh gentleman, and his mother Mary the eldeſt daughter of John Dudley duke of Northumberland. He was ſent when very young to Chriſt-church college at Oxford, but left the univerſity at 17 to ſet out on his travels. After viſiting France, Germany, Hungary, and Italy, he returned to England in 1575, and was next year ſent by Queen Elizabeth as her ambaſſador to Randolph emperor of Germany. On his return he viſited Don John of Auſtria, governor of the Netherlands, by whom he was received with great reſpect. In 1579, when Queen Elizabeth ſeemed on the point of concluding her long projected marriage with the duke of Anjou, Sir Philip wrote her a letter, in which he diſſuaded her from the match with unuſual elegance of expreſſion, as well as force of reaſoning. About this time a quarrel with the earl of Oxford occaſioned his withdrawing from court; during which retirement he is ſuppoſed to have written his celebrated romance called *Arcadia*.

In 1585, after the queen's treaty with the United States, he was made governor of Fluſhing and maſter of the horſe. Here he diſtinguiſhed himſelf ſo much both by his courage and conduct, that his reputation roſe to the higheſt pitch. He was named, it is pretended, by the republic of Poland as one of the competitors for that crown, and might even have been elected had it not been for the interference of the queen. But his illuſtrious career was ſoon terminated; for in 1586 he was wounded at the battle of Zutphen, and carried to Arnheim, where he ſoon after died. His body was brought to London, and buried in St Paul's cathedral. He is deſcribed by the writers of that age as the moſt perfect model of an accompliſhed gentleman that could be formed even by the wanton imagination of poetry or fiction. Virtuous conduct, polite converſation, heroic valour, and elegant erudition, all concurred to render him the ornament and delight of the Engliſh court: and as the credit which he enjoyed with the queen and the earl of Leiceſter was wholly employed in the encouragement of genius and literature, his praiſes have been tranſmitted with advantage to poſterity. No perſon was ſo low as not to become an object of his humanity. After the battle of Zutphen, while he was lying on the field mangled with wounds, a bottle of water was brought him to relieve his thirſt; but obſerving a ſoldier near him in a like miſerable condition, he ſaid, *This man's neceſſity is ſtill greater than mine*; and reſigned to him the bottle of water. Beſides his *Arcadia*, he wrote ſeveral ſmaller pieces both in proſe and verſe, which have been publiſhed. Sidney.

SIDNEY, *Algernon*, was the ſecond ſon of Robert earl of Leiceſter, and of Dorothy eldeſt daughter of the earl of Northumberland. He was born about the year 1617. During the civil wars he took part againſt the king, and diſtinguiſhed himſelf as a colonel in the army of the parliament. He was afterwards appointed one of King Charles's judges, but declined appearing in that court. During the uſurpation of Cromwel, Sidney, who was a violent republican, retired to the country, and ſpent his time in writing thoſe diſcourſes on government which have been ſo deſervedly celebrated. After the death of the Protector, he again took part in the public tranſactions of his country, and was abroad on an embaſſy to Denmark when King Charles was reſtored. Upon this he retired to Hamburgh, and afterwards to Francfort, where he reſided till 1677, when he returned to England and obtained from the king a pardon. It has been affirmed, but the ſtory deſerves no credit, that during his reſidence abroad King Charles hired ruffians to aſſaſſinate him. After his return he made repeated attempts to procure a ſeat in parliament, but all of them proved unſucceſsful. After the intention of the commons to ſeclude the duke of York from the throne had been defeated by the ſudden diſſolution of parliament, Sidney joined with eagerneſs the councils of Ruſſel, Eſſex, and Monmouth, who had reſolved to oppoſe the duke's ſucceſſion by force of arms. Frequent meetings were held at London; while, at the ſame time, a ſet of ſubordinate conſpirators, who were not, however, admitted into their confidence, met and embraced the moſt deſperate reſolutions. Keiling, one of theſe men, diſcovered the whole conſpiracy; and Algernon Sidney, together with his noble aſſociates, was immediately thrown into priſon, and no art was left unattempted in order to involve them in the guilt of the meaner conſpirators.

Howard, an abandoned nobleman, without a ſingle ſpark of virtue or honour, was the only witneſs againſt Sidney; but as the law required two, his diſcourſes on government, found unpubliſhed in his cloſet, were conſtrued into treaſon, and declared equivalent to another witneſs. It was in vain for Sidney to plead that papers were no legal evidence; that it could not be proved they were written by him; and that if they were, they contained nothing treaſonable. The defence was overruled; he was declared guilty, condemned, and executed! His attainder was reverſed in the firſt year of King William.

Sidney ‖ Sidus.

He was a man of extraordinary courage; ſteady even to obſtinacy; of a ſincere but rough and boiſterous temper. Though he profeſſed his belief in the Chriſtian religion, he was an enemy to an eſtabliſhed church, and even, according to Burnet, to every kind of public worſhip. In his principles he was a zealous republican: government was always his favourite ſtudy; and his eſſays on that ſubject are a proof of the progreſs which he made.

SIDON, in *Ancient Geography*, a city of Phœnicia in Aſia, famous in Scripture for its riches, ariſing from the extenſive commerce carried on by its inhabitants. Heavy judgements were denounced againſt the Sidonians on account of their wickedneſs, which were accompliſhed in the time of Ochus king of Perſia: for that monarch having come againſt them with an army on account of their rebellion, the city was betrayed by its king; upon which the wretched inhabitants were ſeized with deſpair; they ſet fire to their houſes, and 40,000, with their wives and children, periſhed in the flames.

This city is now called *Saide*, and, according to Mr Bruce's account, not only its harbour is filled up with ſand, but the pavement of the ancient city ſtood 7½ feet lower than the ground on which the preſent city ſtands. Volney deſcribes it as an ill-built dirty city. Its length along the ſea-ſhore is about 600 paces, and its breadth 150. At the north-weſt ſide of the town is the caſtle, which is built in the ſea itſelf, 80 paces from the main land, to which it is joined by arches. To the weſt of this caſtle is a ſhoal 15 feet high above the ſea, and about 200 paces long. The ſpace between this ſhoal and the caſtle forms the road, but veſſels are not ſafe there in bad weather. The ſhoal, which extends along the town, has a baſon incloſed by a decayed pier. This was the ancient port; but it is ſo choked up by ſand, that boats alone can enter its mouth near the caſtle. Fakr-el-din, emir of the Druſes, deſtroyed all theſe little ports from Bairout to Acre, by ſinking boats and ſtones to prevent the Turkiſh ſhips from entering them. The baſon of Saide, if it were emptied, might contain 20 or 25 ſmall veſſels. On the ſide of the ſea, the town is abſolutely without any wall; and that which encloſes it on the land ſide is no better than a priſon-wall. The whole artillery does not exceed ſix cannons, and theſe are without carriages and gunners. The garriſon ſcarcely amounts to 100 men. The water comes from the river Aoula, through open canals, from which it is fetched by the women. Theſe canals ſerve alſo to water the orchards of mulberry and lemon trees.

Saide is a conſiderable trading town, and is the chief emporium of Damaſcus and the interior country. The French, who are the only Europeans to be found there, have a conſul, and five or ſix commercial houſes. Their exports conſiſt in ſilks, and particularly in raw and ſpun cottons. The manufacture of this cotton is the principal art of the inhabitants, the number of whom may be eſtimated at about 5000. It is 45 miles weſt from Damaſcus. E. Long. 36. 5. N. Lat. 37.

SIDUS GEORGIUM, in *Aſtronomy*, a new primary planet, diſcovered by Dr Herſchell in the year 1781. By moſt foreign, and even by ſome Britiſh philoſophers, it is known by the name of *Herſchell*, in honour of the diſcoverer. As the other planets are diſtinguiſhed by marks or characters, the planet Herſchell is diſtinguiſhed by an H, the initial letter of the diſcoverer's name, and a croſs to ſhow that it is a Chriſtian planet. See ASTRONOMY *Index*.

Siege ‖ Sierra.

SIEGE, in the art of war, is to ſurround a fortified place with an army, and approach it by paſſages made in the ground, ſo as to be covered againſt the fire of the place.

SIEGEN, a town of Germany in Wetteravia, with a caſtle and the title of a principality, which it gives to a branch of the houſe of Naſſau. It is ſeated on a river of the ſame name, in E. Long. 8. 5. N. Lat. 50. 53.

SIENNA, a large, ancient, and celebrated city of Tuſcany in Italy; capital of the Sienneſe, with an archbiſhop's ſee, a famous univerſity, and a citadel. It is about four miles in circumference, and ſurrounded with an old wall. The metropolitan church is much eſteemed by travellers; and though it is a Gothic ſtructure, the architecture is admirable. It is built with black and white marble, and the pavement is of moſaic work. The town is adorned with a great number of palaces, fountains, and ſuperb churches, as alſo a magnificent hoſpital. The great area is round, and the houſes about it are of the ſame height, ſupported by piazzas, under which people may walk in hot or rainy weather; in the middle is a baſon, which can be filled with water at any time, to repreſent a ſea-fight with ſmall veſſels. The Italian language is taught here with ſuch purity, that a great many foreigners frequent it on that account. It is ſeated on three eminences, in a fertile ſoil, in E. Long. 11. 11. N. Lat. 43. 10.

SIENNESE, a duchy in Italy; bounded on the north by the Florentino, on the ſouth by the Mediterranean ſea and the duchy of Caſtro, on the eaſt by the Perugino and Orvietano, and on the weſt by the Florentino and the Tuſcan ſea; being about 55 miles in length, and as much in breadth. The ſoil is pretty fertile, eſpecially in mulberry trees, which feed a great number of ſilk-worms; and there are ſeveral mineral ſprings. Sienna is the capital town.

SIERRA LEONA, a large country on the weſt coaſt of Africa, which ſome extend from the Grain Coaſt on the ſouth-eaſt to Cape Verga or Vega on the north-weſt, i. e. between 7° and 10° N. Lat. Others, however, confine the country between Cape Verga and Cape Tagrin. There runs through it a great river of the ſame name, of which the ſource is unknown, but the mouth is in longitude 12. 30. weſt, lat. 8. 5. north, and is nine miles wide. The climate and ſoil of this tract of country appear to be, on both ſides of the river, among the beſt in Africa, or at leaſt the moſt favourable to European conſtitutions. The heat is much the ſame as that of the Weſt Indies; but on the higher grounds there is a cool ſea breeze, and in the mountainous parts the air is very temperate. According to Lieutenant Matthew, "Sierra Leona, if properly cleared and cultivated, would be equal in ſalubrity and ſuperior in produce to any of the iſlands in the Weſt Indies;" and others have affirmed, that "the air is better for a man's health than in many places of Europe." Theſe advantages of climate induced the Engliſh to eſtabliſh a factory at Sierra Leona; but they choſe not the moſt healthful ſituation. For the benefit of a ſpring of good water they fixed their reſidence in a low valley, which is often overſpread with miſts and noiſome vapours, while the

air

Sierra. air is clear and ſerene on the ſummits of the hills, to which water from the well might be eaſily carried.

Within the diſtrict occupied by this colony are the Foulahs, who are in general of a tawny complexion, though many of them are entirely black. They lead a wandering life, and roam about the country with large droves of cows, ſheep, goats, and horſes. They are much praiſed by travellers for their hoſpitality; nor is their humanity in other reſpects, leſs commendable; for, if one of their countrymen have the misfortune to fall into ſlavery, the reſt join ſtock to redeem him. Elephants are ſo numerous in the country of the Foulahs, that they are frequently ſeen in droves of 200 together. The people are very dexterous at hunting them, and other wild beaſts; from which they derive their principal articles of trade.

The animal productions of Sierra Leona are lions, from which it has its name; leopards, hyænas, muſk cats, and many kinds of weaſels; the japanzee or chimpanzee, a ſpecies of ſimia, which has a ſtill more ſtriking reſemblance to the human figure than even the ouran outang; porcupines, wild hogs, ſquirrels, and antelopes. Beſides theſe, which are natives of the country, oxen thrive in it, and even grow fat; aſſes too are employed in labour, and do not ſuffer by the climate; but ſheep ſuffer much from the heat, change their wool into hair, grow lean and increaſe very little; while the hardy goat is here as prolific and large as in any other country. Of the birds which frequent the woods of Sierra Leona we can give no perfect account. A ſpecies of crane is mentioned as eaſily tamed; common poultry multiply faſt; ducks thrive well, but geeſe and turkeys ſeem not to agree with the climate. Turtles of all kinds are very common, and ſometimes of a large ſize. Crocodiles or alligators of a non-deſcript ſpecies have been found ten or twelve feet in length, and lizards of ſix different ſpecies. Snakes, which are almoſt innumerable, haunt the houſes in the night in ſearch of poultry; and one was obſerved which meaſured 18 feet, but was happily found not to be venomous. Fiſhes are in great variety both in the ſea and in the rivers. Beſides the whale, the ſhark, ſtinging ray, and porpoiſe, there are eels, horſe-mackarel, tarpoons, cavillos, mullets, ſnappers, yellow-tails, old-maids, ten-pounders, and ſome other fiſhes; all of which, except the eels and ten-pounders, are eſteemed fine eating. Oyſters are found in great abundance, and another ſhell-fiſh, which the natives eat. Among the zoophytes, none is more worthy of notice than the common ſponge, which covers all the ſandy beaches of the river, particularly on the Bullom ſhore, and would fetch a high price in Great Britain.

Of the numerous vegetable productions of Sierra Leona, our limits will permit us only to mention the following. Rice, which is the plant chiefly cultivated, as the natives ſubſiſt almoſt entirely upon it, grows both in the high and low grounds. It proſpers indeed beſt in ſwamps, though the grain is better in a drier ſoil. Next to rice the caſſada conſtitutes the chief food of the inhabitants, and is cultivated with great care. The country likewiſe produces yams, various kinds of potatoes, eddoes, or the *arum eſculentum*. Oil-palm, plantains, and bananas; papaw, guava, oranges and limes; pompions, melons, and cucumbers; pine-apples, pigeon-peas, which dreſſed like Engliſh peas are a good pulſe; maize or Indian-corn; millet, cocoa-nut trees; ockra; the tallow-tree; a great variety of tamarinds; different kinds of fig-trees and plums; a kind of fruit reſembling grapes, but more acid and acrid; cherries reſembling a fine nectarine in taſte; a ſpecies of the bread fruit-tree; the cream fruit, ſo called becauſe when wounded it yields a fine white juice reſembling ſugar or the beſt milk, of which the natives are very fond; the malaguetta pepper, or grains of paradiſe; a new ſpecies of nutmeg, but whether ſo good as the common ſort has not yet been aſcertained; a new ſpecies of the Peruvian bark, which it is hoped will prove as uſeful as the other; and cola, a fruit highly eſteemed by the natives for the ſame virtues with that bark; the ricinus, caſſia, dye-ſtuffs, and gums, of great value; cotton, tobacco, and ſugar-canes, which, it is thought, would thrive exceedingly well under proper cultivation. Sierra.

Conſidering the ardour of the maritime nations of Europe for ſettling colonies in diſtant regions of the globe, it is ſomewhat ſurpriſing that a climate ſo temperate and a ſoil ſo productive as that of Sierra Leona did not long ago attract their notice. But it was left to be colonized for a better purpoſe than that which firſt drew the natives of Europe to the Weſt Indies and the American continent. Being thinly inhabited, Sierra Leona appeared to ſome benevolent gentlemen in England a place where, without incommoding the natives, a ſufficient quantity of ground might be bought on which to ſettle a great number of free negroes, who in 1786 ſwarmed in London in idleneſs and want. About 400 of theſe wretches, together with 60 whites, moſtly women of bad character and in ill health, were accordingly ſent out, at the charge of government, to Sierra Leona. Neceſſity, it was hoped, would make them induſtrious and orderly; and Captain Thomſon of the navy, who conducted them, obtained, for their uſe, a grant of land to his majeſty from King Tom, the neighbouring chief, and afterwards from Naimbanna, the king of the country. The colony, however, ſoon went to ruin; but the land which they occupied, being about 20 miles ſquare, his majeſty was enabled to grant by act of parliament to another colony founded on better principles and for a ſtill nobler purpoſe.

The moſt intelligent members of that ſociety, which laboured ſo ſtrenuouſly to procure an abolition of the ſlave-trade, juſtly concluding that the natives of Guinea would reap very little benefit from the attainment of their object, unleſs they ſhould be taught the principles of religion and the arts of civil life, which alone can render them really free, conceived the plan of a colony at Sierra Leona to be ſettled for the truly generous purpoſe of civilizing the Africans by maintaining with them a friendly intercourſe, and a commerce in every thing but men. This plan could not be carried into effect but at a very great expence. Subſcriptions were therefore opened upon rational and equitable terms, and a ſum deemed ſufficient was ſpeedily raiſed. An act of parliament was paſſed in favour of the ſubſcribers, by which they were incorporated by the denomination of the *Sierra Leona Company;* and in purſuance of that act they held their firſt meeting at London in October 1791.

The directors having ſtated the natural advantages of Sierra Leona, and its preſent miſerable condition, obſerved, that they had not merely to eſtabliſh a commercial

Sierra. mercial factory, but that, to introduce civilization, cultivation, and a ſafe trade, the company muſt provide for the ſecurity of the perſons and property of the coloniſts. The directors therefore reſolved, that three or four veſſels ſhould ſail at once, with ſuch a number of people as would be able to protect and aſſiſt each other; with goods both for trade and for the ſupply of the colony. Accordingly ſeveral veſſels ſailed, having on board a council for the government of the colony and the management of the company's affairs; a number of artificers and other ſervants of the company; ſome ſoldiers, and a very few Engliſh ſettlers. The directors were laudably cautious in the choice of coloniſts. They admitted into the ſociety no white man of bad character, or who was not a declared enemy to the ſlave-trade; and as the chief object of their enterpriſe was the civilization of the natives, it was with great propriety that they choſe more than three-fourths of their ſettlers from the free negroes in Nova Scotia, who had borne arms for the Britiſh government during the American war. The ſuperintendant and council were particularly inſtructed to ſecure to all blacks and people of colour, at Sierra Leona, equal rights and equal treatment, in all reſpects, with whites. They were to be tried by jury, as well as others; and the council was deſired to allot to the blacks employments ſuited to their preſent abilities, and to afford them every opportunity of cultivating their talents. All practicable means of maintaining ſubordination were directed to be uſed; and the council was eſpecially inſtructed to promote religion and morals, by ſupporting public worſhip and the due obſervance of the Sabbath, and by the inſtruction of the people, and the education of children. But no perſon was to be prevented from performing or attending religious worſhip in whatever place, time, or manner, he might think fit, or from peaceably inculcating his own religious opinions. Orders were given in chooſing the ſcite of a town, to conſider health as the firſt object; and the firſt town was directed to be called *Free-Town*. Articles for building and cultivation were ſent out, beſides the cargoes for proſecuting the company's commerce; and ſchools for reading, writing, and accounts, were ordered to be ſet up for the purpoſe of inſtructing the children of ſuch natives as ſhould be willing to put them under the company's care.

The leading object of the company was to ſubſtitute, for that diſgraceful traffic which has too long ſubſiſted, a fair commerce with Africa, and all the bleſſings which might be expected to attend it. Conſiderable advantages appeared hereby likely to reſult to Great Britain, not only from our obtaining ſeveral commodities cheaper, but alſo for opening a market for Britiſh manufactures, to the increaſing demands of which it is difficult to aſſign a limit. From this connection, Africa was likely to derive the ſtill more important benefits of religion, morality, and civilization. To accompliſh theſe purpoſes, it was neceſſary for the company to poſſeſs a tract of land, as a repoſitory for their goods, and which the Africans might cultivate in peace, ſecure from the ravages of the ſlave-trade. It had been aſcertained, beyond a doubt, that the climate and ſoil of Africa were admirably ſuited to the growth of ſugar, ſpices, coffee, cotton, indigo, rice, and every other ſpecies of tropical produce. The company propoſed to inſtruct the natives to raiſe theſe articles, and to ſet them the example, by a ſpirited cultivation, on its own account. Directions were given to the company's commercial agent to puſh forward a trade, in a mode preſcribed, in the preſent produce of Africa. Meaſures were taken for cultivating, on the company's account, the moſt profitable tropical produce; and in particular, a perſon of long experience in the Weſt Indies was ordered to begin a ſugar plantation. A mineralogiſt and botaniſt were likewiſe engaged to go out and explore the country for new articles of commerce. Sierra.

Every thing being thus ſettled upon the moſt equitable and benevolent principles, the ſhips ſailed with the Britiſh coloniſts, to whom, in March 1792, were added 1131 blacks from Nova Scotia. The native chiefs being reconciled to the plan, and made to underſtand its beneficent tendency towards their people, the colony proceeded to build *Free-Town*, on a dry and rather elevated ſpot on the ſouth ſide of the river. It occupied between 70 and 80 acres, its length being about one-third of a mile, and its breadth nearly the ſame; and it contained near 400 houſes, each having one-twelfth of an acre annexed, on which a few vegetables were raiſed. There were nine ſtreets running from north-weſt to ſouth-eaſt, and three croſs ſtreets, all 80 feet wide, except one of 160 feet, in the middle of which were all the public buildings. Theſe conſiſted of a governor's houſe and offices; a large ſtore-houſe; a large hoſpital; ſix or eight other houſes, offices, and ſhops, occupied by the company's ſervants; and a church capable of containing 800 people. The coloniſts at firſt ſuffered much from the rainy ſeaſon, againſt which it was not in their power to provide ſufficient protection; but at the end of it they recovered in a great meaſure their health and ſpirits, and proceeded with alacrity to execute the various purpoſes of their ſettlement. To excite emulation in culture, the government gave premiums to thoſe coloniſts who raiſed the greateſt quantities of rice, yams, eddoes, cabbages, Indian corn, and cotton, reſpectively. To limit the exceſſes of the ſlave-trade, and gain the favour of the neighbouring chiefs, the directors inſtructed the governor and council to redeem any native from the neighbourhood, who ſhould be unjuſtly ſold either to or by a Britiſh ſubject. The ſervants of the company conducted themſelves with the utmoſt propriety, being ſober, moral, and exemplary; and from the labours of the clergymen were derived ſervices highly important in every point of view. Before the end of two years from the inſtitution of the colony, order and induſtry had begun to ſhow their effects in an increaſing proſperity. The woods had been cut down to the diſtance of about three Engliſh miles all round the town. By theſe means the climate had become healthier, and ſickneſs had diminiſhed. The fame of the colony ſpread not only along the whole weſtern coaſt of Africa, but alſo to parts far diſtant from the coaſt; embaſſies had been received of the moſt friendly nature from kings and princes ſeveral hundred miles diſtant; and the native chiefs had begun to ſend their children to the colony, with full confidence, to be taught reading, writing, and accounts, and to be brought up in the Chriſtian religion. In a word, it was not without grounds that the directors looked forward to that joyful period when, by the influence of the company's meaſures, the continent of Africa ſhould be reſcued from her preſent ſtate of darkneſs and miſery, and exhibit a delightful ſcene of light

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and knowledge of civilization and order, of peaceful induſtry and domeſtic comfort. On their beneficent exertions they hoped with confidence for the bleſſing of Providence; they were countenanced and ſupported by the Britiſh government; and upon the breaking out of the preſent war, the French Convention authoriſed one of their agents to write to the directors, requeſting a full account of the deſign of the inſtitution, and the names of the ſhips employed in their ſervice, and aſſuring them of the good wiſhes of the French government to ſo noble an undertaking. How completely that government fulfilled its promiſe is very generally known. Having vindicated the rights of man in Europe by the violation of every principle of truth and juſtice, they determined by the ſame means to give light and liberty to the Africans; and that they have fully carried their determination into effect will be ſeen by the following extract of a letter from Mr Afzelius, the company's botaniſt, dated Sierra Leona, 15th November 1794. "The French have been here and have ruined us. They arrived on the 28th of September laſt, early in the morning, with a fleet conſiſting of one large ſhip, two frigates, two armed brigs, and one cutter, together with two large armed merchant ſhips, taken by them at the Iſles de Loſs, an Engliſh ſlave factory to the north of our colony, and which they have alſo deſtroyed and burnt. So well had they concealed their nation, that we took them at firſt for Engliſh. They had Engliſh-built veſſels, which were rigged in the Engliſh way. They ſhowed the Engliſh flag, and had their ſailors, at lead thoſe we ſaw on deck, dreſſed like Engliſh. In ſhort, we did not perceive our miſtake till we obſerved them pointing their guns. We had not ſtrength ſufficient to reſiſt, and therefore our governor gave orders, that as ſoon as they ſhould begin to fire, the Britiſh flag ſhould be ſtruck, and a flag of truce hoiſted. Accordingly this was done, but ſtill they continued firing, and did much damage, both within and without the town. They killed two people and wounded three or four. But as we did not underſtand the meaning of this proceeding, we aſked them for an explanation; and they anſwered us, that we ſhould diſplay the flag of liberty, as a proof of our ſubmiſſion. We aſſured them that it ſhould already have been done, if we had had any, which terminated the hoſtilities from the ſhips. In the mean time, moſt of the inhabitants had fled from the town, having taken with them as much of their property as they conveniently could in ſuch a hurry. I was with the governor, together with a number of others; but as ſoon as I was certain they were enemies, I went towards my own houſe with a view to ſave as much as poſſible of my property and natural collections; but was received in ſuch a manner, that I could not venture to proceed. My houſe was ſituated near the ſhore, and unfortunately juſt oppoſite the frigate which fired. I ſaw the balls paſſing through the houſe, and heard them whizzing about my ears. I ſaw that I ſhould loſe all my property; but life was dearer to me, and I haſtened to the woods.

Wadſtrom, part ii. p. 280.

"In the afternoon the enemy landed, finding the town almoſt deſtitute of people, but rich in proviſions, clothing and other ſtores. They began immediately to break open the houſes and to plunder. What they did not want, they deſtroyed, burnt, or threw into the river. They killed all the cattle and animals they found in the fields or ſtreets, yards or elſewhere, not ſparing even aſſes, dogs, and cats. Theſe proceedings they continued the whole ſucceeding week, till they had entirely ruined our beautiful and proſpering colony; and when they found nothing more worth plundering, they ſet fire to the public buildings and all the houſes belonging to the Europeans; and burnt, as they ſaid, by miſtake nine or ten houſes of the coloniſts. In the mean time, they were not leſs active on the water. They ſent three of their veſſels to Bance iſland, an Engliſh ſlave factory higher up the river, which they plundered and burnt, together with ſome ſlave ſhips lying there. They took beſides about 10 or 12 prizes, including the company's veſſels. Moſt of theſe they unloaded and burnt. They took along with them alſo two of our armed veſſels, one of which was a large ſhip, laden with proviſions, and which had been long expected; but ſhe unfortunately arrived a few days too ſoon, and was taken with her whole cargo. We expected at leaſt to receive our private letters, but even this was refuſed, and they were thrown overboard. At laſt, after inflicting on us every hardſhip we could ſuffer, only ſparing our lives and the houſes of the coloniſts, they ſailed on the 13th of October laſt, at noon, proceeding downwards to the Gold Coaſt, and left us in the moſt dreadful ſituation, without proviſions, medicines, clothes, houſes, or furniture, &c. &c. and I fear much, that moſt of us ſhould have periſhed, had not our friends in the neighbourhood, both natives and Europeans, who were ſo happy as to eſcape the enemy, been ſo kind as to ſend us what they could ſpare. In the mean time, moſt of us have either been, or ſtill are, very ſick, and many have died for want of proper food and medicine. The worſt, however, is now paſt. At leaſt we are not in any want of proviſion, although of the coarſeſt kind, but are deſtitute of the moſt neceſſary articles and utenſils for the houſe, the table, and the kitchen."

Sierra.

It was thus that the Convention executed their purpoſe of *ſpreading light and liberty through the world.* The Sierra Leona colony was eſtabliſhed for no other end than to aboliſh the ſlave-trade, to enlighten the Africans, and to render them virtuous, rational, free, and happy; and thoſe powerful patrons of the rights of man deſtroyed that colony with many circumſtances of the moſt wanton cruelty. Though Mr Afzelius is a Swede, and ought therefore to have been protected by the laws of neutrality, they burnt his houſe with the reſt; deprived him of his trunks, his clothes, and his bed; deſtroyed the natural curioſities which he had collected at the hazard of his life; and carried away the inſtruments by means of which only he could collect more.

In 1798, Free-Town, conſiſted of about 300 houſes, and a number of public buildings, together with three wharfs. The government-houſe, ſo ſituated as to command the town and harbour, was protected by a paliſade, and ſix pieces of cannon. The inhabitants of this colony were then computed at 1200, of whom 15 were ſhopkeepers, 25 fiſhermen, 10 trading ſhipmaſters, owners of ſmall veſſels, 15 ſeamen, 20 labourers employed by the company, 4 ſchoolmaſters; about one half of the whole population petty farmers, and the reſt mechanics. The number of Europeans reſident at that time in the colony was

Sierra. was about 30, and nearly 400 free natives wrought as labourers for wages, on the farms in the colony.

A charter of juſtice was obtained in 1800, to controul the turbulence of the blacks from Nova Scotia, and a ſmall military force from Goree was ſtationed at Sierra Leona. Parliament allowed the company 7000l. for the purpoſe of erecting a fort, with a promiſe of 8000l. more for the ſame undertaking. The company alſo received 10,000l. for their expence in ſettling the blacks from Nova Scotia, and a vote of parliament agreed to pay 4000l. for ſupporting the civil government of the colony.

The Maroons arrived in Sierra Leona in the month of October 1800, and greatly aſſiſted in ſuppreſſing an inſurrection of the Nova Scotia blacks, who had attempted to ſeize on the government of the colony. A body of natives of the Timmaney, headed by two of the fugitive blacks, made an attack on the unfiniſhed fort on the 18th of November, about day-break, but they were repulſed with loſs. A truce was concluded; but it was ſuppoſed that the Timmanee chiefs would make uſe of this interval to form alliances with the natives againſt the Britiſh, in order to exterminate them from this part of Africa. Soldiers to the amount of 65 were brought from Goree, and a ſhip of war was ſtationed in the river, to defend the ſettlement.

In 1802, parliament again voted 10,000l. to the company, for the annual expence of the ſettlement; and in February 1803, the directors were informed by Lord Hobart, that it would be for the intereſt of the colony to transfer the civil and military power from the company to the Britiſh government.

When Captain Hallowell arrived at Sierra Leona on the 12th of January 1803, he found the colony in a wretched condition, reporting to government on his return, that the Maroons were not ſatisfied with their condition, regarding it as one in which they could not find ſubſiſtence; that proviſions of every deſcription were both ſcarce and dear; that its inhabitants lived in hourly danger from the natives; and that the whole coloniſts lived in a ſtate of deſpondency. Government, however, was afterwards ſatisfied, from the explanations of the directors and their ſervants, that the account of Captain Hallowell was by much too unfavourable. Expectations are indulged that, ſince the entire abolition of the ſlave-trade, the colony will ſoon obtain a flouriſhing trade with the natives, in the exchange of Britiſh manufactures for the raw produce of the interior parts of Africa.

A committee of the houſe of commons has had a moſt ſatisfactory proof of the progreſſive improvement of the internal adminiſtration of the colony, ariſing from the additional powers conferred on the company by the charter of juſtice, and the increaſed vigilance and exertion of the Company's ſervants. The Maroons have, in a great meaſure, abandoned ſome pernicious habits they had long indulged, and by their attachment to the colony, and peaceable demeanour, have merited the approbation of government. The progreſs made in the erection of works has been conſiderable, and the colony may be regarded in a ſtate of ſufficient ſecurity againſt the attack of any native power. A body of volunteers has been raiſed within the colony, whoſe fidelity and attachment have been tried by experience. The ſickneſs and mortality which for ſome time exiſted, have in a great degree ſubſided; and there is reaſon to believe, that it rather originated with the troops when they entered the colony, and their habits of intemperance, than from any diſorder connected with their reſidence in that ſituation. The number of births, which has for ſome time exceeded that of the deaths in the colony, is a ſatisfactory proof that it is not unfriendly to population. Sierra || Si-Fans.

Sierra Leona is already rendered ſecure againſt the only enemies whoſe hoſtilities it has immediately to apprehend; its reſources are increaſed; its cultivation reviving; and it is in the poſſeſſion of every advantage that can ariſe from the enjoyment of internal tranquillity and order. It is ſufficiently manifeſt, from the inconveniences already experienced in the colony, that during its continuance, it will be eſſentially neceſſary to ſupport a local government capable of maintaining order among its inhabitants, and affording them protection. The expence of the civil eſtabliſhment for ſome years to come cannot be eſtimated at leſs than 10,000l. per annum *; that of completing the propoſed works has been eſtimated at 8000l. It alſo appears that the defence of the colony will require the preſent volunteer force to be permanently kept up, the expence of which has been eſtimated at 4000l. per annum; or if that eſtabliſhment ſhould be diſcontinued, a regular garriſon muſt be maintained at the conſtant eſtabliſhment of 100 effective men, excluſive of about 20 artillery men, which, conſidering the numerous caſualties in that climate, and great expence of ſupporting them, would exceed the ſum already mentioned.

* *The expence of the civil eſtabliſhment for* 1801 *exceeded* 17,000l.

SIERRA MORENA, a conſiderable ridge of mountains of Andaluſia in Spain. See SPAIN.

SIEUR, a title of reſpect among the French, like that of *maſter* among us. It is much uſed by lawyers, as alſo by ſuperiors in their letters to inferiors.

SIFANTO, or SIPHANTO, an iſland of the Archipelago, to the weſt of Paros, to the north-eaſt of Milo, and to the ſouth-weſt of Serphanto. The air is ſo good here, that many of the inhabitants live to the age of 120; and their water, fruits, wild fowl, and poultry, are excellent, but more eſpecially the grapes. It abounds with marble and granite, and is one of the moſt fertile and beſt cultivated of theſe iſlands. The inhabitants employ themſelves in cultivating olive-trees and capers; and they have very good ſilk. They trade in figs, onions, wax, honey, and ſtraw-hats; and may be about 8000 in all. E. Long. 25. 15. N. Lat. 37. 9.

SI-FANS, or TOU-FANS, a people inhabiting the country on the weſt of China. Their country is only a continued ridge of mountains, incloſed by the rivers Hoang-ho on the north, Ya-long on the weſt, and Yang-tſe-kiang on the eaſt, between the 30th and 35th degrees of north latitude. *Groſier's General Deſcription of China*, vol. i. p. 203.

The Si-fans are divided into two kinds of people; the one are called by the Chineſe *Black Si-fans*, the other *Yellow*; names which are given them from the different colours of their tents. The black are the moſt clowniſh and wretched; they live in ſmall bodies, and are governed by petty chiefs, who all depend upon a greater.

The yellow Si-fans are ſubject to families, the oldeſt of which becomes a lama, and aſſumes the yellow dreſs. Theſe lama princes, who command in their reſpective diſtricts, have the power of trying cauſes, and puniſh-

ing

Si-fans || Sight.

ing criminals; but their government is by no means burdenſome; provided certain honours are paid them, and they receive punctually the dues of the god Fo, which amount to very little, they moleſt none of their ſubjects. The greater part of the Si-fans live in tents; but ſome of them have houſes built of earth, and even brick. Their habitations are not contiguous; they form at moſt but ſome ſmall hamlets, conſiſting of five or ſix families. They feed a great number of flocks, and are in no want of any of the neceſſaries of life. The principal article of their trade is rhubarb, which their country produces in great abundance. Their horſes are ſmall; but they are well ſhaped, lively and robuſt.

Theſe people are of a proud and independent ſpirit, and acknowledge with reluctance the ſuperiority of the Chineſe government, to which they have been ſubjected: when they are ſummoned by the mandarins, they rarely appear; but the government, for political reaſons, winks at this contempt, and endeavours to keep theſe intractable ſubjects under by mildneſs and moderation: it would, beſides, be difficult to employ rigorous means in order to reduce them to perfect obedience; their wild and frightful mountains (the tops of which are always covered with ſnow, even in the month of July) would afford them places of ſhelter, from which they could never be driven by force.

The cuſtoms of theſe mountaineers are totally different from thoſe of the Chineſe. It is, for example, an act of great politeneſs among them to preſent a white handkerchief of taffety or linen, when they accoſt any perſon whom they are deſirous of honouring. All their religion conſiſts in their adoration of the god Fo, to whom they have a ſingular attachment; their ſuperſtitious veneration extends even to his miniſters, on whom they have conſidered it as their duty to confer ſupreme power and the government of the nation.

SIGAULTIAN OPERATION, a method of delivery in caſes of difficult labour, firſt practiſed by M. Sigault. It conſiſts in enlarging the dimenſions of the pelvis, in order to procure a ſafe paſſage to the child without injuring the mother.

SIGESBECKIA, a genus of plants belonging to the claſs of ſyngeneſia, and to the order of polygamia ſuperflua; and in the natural ſyſtem ranging under the 49th order, *Compoſitæ*. See BOTANY *Index*.

SIGETH, a town of Lower Hungary, and capital of a county of the ſame name. It is ſeated in a moraſs, and has a triple wall, with ditches full of water; and is defended by a citadel, being one of the ſtrongeſt places in Hungary. It now belongs to the houſe of Auſtria, and was retaken from the Turks in 1669, after it had been blocked up two years. In ſome maps it is called *Zigat*. E. Long. 18. 58. N. Lat. 46. 17.

SIGHING, an effort of nature, by which the lungs are put into greater motion, and more dilated, ſo that the blood paſſes more freely, and in greater quantity, to the left auricle, and thence to the ventricle. Hence we learn, ſays Dr Hales, how ſighing increaſes the force of the blood, and conſequently proportionably cheers and relieves nature, when oppreſſed by its too ſlow motion, which is the caſe of thoſe who are dejected and ſad.

SIGHT, or VISION. See ANATOMY, N° 142. and *Index* ſubjoined to OPTICS.

Imperfection of SIGHT *with regard to Colours*. Under the article COLOURS, is given an inſtance of a ſtrange deficiency of ſight in ſome people, who could not diſtinguiſh between the different colours. In the Phil. Tranſ. vol. lxviii. p. 611. we have an account of a gentleman who could not diſtinguiſh a claret colour from black. Theſe imperfections are totally unaccountable from any thing we yet know concerning the nature of this ſenſe.

Sight || Naval Signals.

Second SIGHT. See *SECOND Sight*.

SIGN, in general, the mark or character of ſomething abſent or inviſible. See CHARACTER.

Among phyſicians, the term *ſign* denotes ſome appearance in the human body which ſerves to indicate or point out the condition of the patient with regard to health or diſeaſe.

SIGN, in *Algebra*. See ALGEBRA.

SIGN, in *Aſtronomy*, a conſtellation containing a 12th part of the zodiac. See ASTRONOMY *Index*.

NAVAL SIGNALS. When we read at our fireſide the account of an engagement, or other intereſting operation of an army, our attention is generally ſo much engaged by the reſults, that we give but little to the movements which led to them, and produced them; and we ſeldom form to ourſelves any diſtinct notion of the conduct of the day. But a profeſſional man, or one accuſtomed to reflection, and who is not ſatisfied with the mere indulgence of eager curioſity, follows every regiment in its movements, endeavours to ſee their connection, and the influence which they have had on the fate of the day, and even to form to himſelf a general notion of the whole ſcene of action, at its different intereſting periods. He looks with the eye of the general, and ſees his orders ſucceed or fail.

But few trouble themſelves farther about the narration. The movement is ordered; it is performed; and the fortune of the day is determined. Few think how all this is brought about; and when they are told that during the whole of the battle of Cuſtrin, Frederic the Great was in the upper room of a country inn, from whence he could view the whole field, while his aids de camp, on horſeback, waited his orders in the yard below, they are ſtruck with wonder, and can hardly conceive how it can be done: but, on reflection, they ſee the poſſibility of the thing. Their imagination accompanies the meſſenger from the inn yard to the ſcene of action; they hear the general's orders delivered, and they expect its execution.

But when we think for a moment on the ſituation of the commander of a fleet, confined on board one ſhip, and this ſhip as much, or more cloſely, engaged, than any other of the fleet; and when we reflect that here are no meſſengers ready to carry his orders to ſhips of the ſquadron at the diſtance of miles from him, and to deliver them with preciſion and diſtinctneſs, and that even if this were poſſible by ſending ſmall ſhips or boats, the viciſſitudes of wind and weather may render the communication ſo tedious that the favourable moment may be irretrievably loſt before the order can be conveyed.—When we think of all theſe circumſtances, our thoughts are bewildered, and we are ready to imagine that a ſea-battle is nothing but the unconnected ſtruggle of individual ſhips; and that when the admiral has once "cried havoc, and let ſlip the dogs of war,"

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1 Signals a language to the eye.

he has done all that his ſituation empowers him to do, and he muſt leave the fate of the day to the bravery and ſkill of his captains and ſailors.

Yet it is in this ſituation, apparently the moſt unfavourable, that the orders of the commander can be conveyed, with a diſpatch that is not attainable in the operations of a land army. The ſcene of action is unincumbered, ſo that the eye of the general can behold the whole without interruption. The movements which it is poſſible to execute are few, and they are preciſe. A few words are ſufficient to order them, and then the mere fighting the ſhips muſt always be left to their reſpective commanders. This ſimplicity in the duty to be performed has enabled us to frame a language fully adequate to the buſineſs in hand, by which a correſpondence can be kept up as far as the eye can ſee. This is the language of SIGNALS, a language by writing, addreſſed to the eye, and which he that runneth may read. As in common writing certain arbitrary marks are agreed on to expreſs certain ſounds uſed in ſpeech, or rather, as in hieroglyphics certain arbitrary marks are agreed on to expreſs certain thoughts, or the ſubjects of theſe thoughts; ſo here certain exhibitions are made, which are agreed on to expreſs certain movements to be executed by the commander to whom they are addreſſed, and all are enjoined to keep their eyes fixed on the ſhip of the conductor of the fleet, that they may learn his will.

2 Uſed in ancient times,

It is ſcarcely poſſible for any number of ſhips to act in concert, without ſome ſuch mode of communication between the general and the commanders of private ſhips. We have no direct information of this circumſtance in the naval tactics of the ancient nations, the Greeks and Romans; yet the neceſſity of the thing is ſo apparent, that we cannot ſuppoſe it to have been omitted by the moſt ingenious and the moſt cultivated people who have appeared on the great theatre of the world: and we are perſuaded that Themiſtocles, Conon, and other renowned ſea commanders of Athens, had ſignals by which they directed the movements of their fleets. We read, that when Ægeus ſent his ſon Theſeus to Crete, it was agreed on, that if the ſhip ſhould bring the young prince back in ſafety, a white flag ſhould be diſplayed. But thoſe on board, in their joy for reviſiting their country after their perilous voyage, forgot to hoiſt the concerted ſignal. The anxious father was every day expecting the ſhip which ſhould bring back his darling ſon, and had gone to the ſhore to look out for her. He ſaw her, but without the ſignal agreed on. On which the old man threw himſelf into the ſea. We find, too, in the hiſtory of the Punic wars by Polybius, frequent alluſions to ſuch a mode of communication; and Ammianus Marcellinus ſpeaks of the *ſpeculatores* and *vexillarii*, who were on board the ſhips in the Adriatic. The coins both of Greece and Rome exhibit both flags and ſtreamers. In ſhort, we cannot doubt of the ancients having practiſed this hieroglyphical language. It is ſomewhat ſurpriſing that Lord Dudley, in his *Arcano del Mare*, in which he makes an oſtentatious diſplay of his knowledge of every thing connected with the ſea ſervice, makes no expreſs mention of this very eſſential piece of knowledge, although he muſt, by his long reſidence in Italy, have known the marine diſcipline of the Venetians and Genoeſe, the greateſt maritime powers then in Europe.

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3 as well as in modern;

In the naval occurrences of modern Europe, mention is frequently made of ſignals. Indeed, as we have already obſerved, it ſeems impoſſible for a number of ſhips to act in any kind of concert, without ſome method of communication. Numberleſs ſituations muſt occur, when it would be impoſſible to convey orders or information by meſſengers from one ſhip to another, and coaſt and alarm ſignals had long been practiſed by every nation. The idea, therefore, was familiar. We find, in particular, that Queen Elizabeth, on occaſion of the expedition to Cadiz, ordered her ſecretaries to draw up inſtructions, which were to be communicated to the admiral, the general, and the five counſellors of war, and by them to be copied and tranſmitted to the ſeveral ſhips of the navy, not to be opened till they ſhould arrive in a certain latitude. It was on this occaſion (ſays our hiſtorian Guthrie,) "that we meet with the firſt regular ſets of ſignals and orders to the commanders of the Engliſh fleet." But, till the movements of a fleet have attained ſome ſort of uniformity, regulated and connected by ſome principles of propriety, and agreed on by perſons in the habit of directing a number of ſhips, we may with confidence affirm that ſignals would be nothing but a parcel of arbitrary marks, appropriated to particular pieces of naval ſervice, ſuch as attacking the enemy, landing the ſoldiers, &c.; and that they would be conſidered merely as referring to the final reſult, but by no means pointing out the mode of execution, or directing the movements which were neceſſary for performing it.

4 but firſt formed into a ſyſtem by James II. when duke of York.

It was James II. when duke of York, who firſt conſidered this practice as capable of being reduced into a ſyſtem, and who ſaw the importance of ſuch a compoſition. He, as well as the king his brother, had always ſhowed a great predilection for the ſea ſervice; and, when appointed admiral of England, he turned his whole attention to its improvement. He had ſtudied the art of war under Turenne, not as a paſtime, but as a ſcience, and was a favourite pupil of that moſt accompliſhed general. Turenne one day pointed him out, ſaying, "Behold one who will be one of the firſt princes and greateſt generals of Europe." When admiral of England, he endeavoured to introduce into the maritime ſervice all thoſe principles of concert and arrangement which made a number of individual regiments and ſquadrons compoſe a great army. When he commanded in the Dutch war, he found a fleet to be little better than a collection of ſhips, on board of each of which the commander and his ſhip's company did their beſt to annoy the enemy, but with very little dependence on each other, or on the orders of the general: and in the different actions which the Engliſh fleet had with the Dutch, every thing was confuſion as ſoon as the battle began. It is remarkable that the famous penſionary De Witt, who from a ſtateſman became a navigator and a great ſea commander in a few weeks, made the ſame repreſentation to the States General on his return from his firſt campaign.

In the memoirs of James II. written by himſelf, we have the following paſſage: "1665. On the 15th of March, the duke of York went to Gunfleet, the general rendezvous of the fleet, and haſtened their equipment. He ordered all the flag officers on board with him every morning, to agree on the order of battle and rank. In former battles, no order was kept, and this under

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under the duke of York, was the firſt in which fighting in a line and regular form of battle was obſerved."

This muſt be conſidered as full authority for giving the duke of York the honour of the invention. For whatever faults may be laid to the charge of this unfortunate prince, his word and honour ſtand unimpeached. And we are anxious to vindicate his claim to it, becauſe our neighbours the French, as uſual, would take the merit of this invention, and of the whole of naval tactics, to themſelves. True it is, that Colbert, the great and juſtly celebrated miniſter of Louis XIV. created a navy for his ambitious and vain-glorious maſter, and gave it a conſtitution which may be a model for other nations to copy. By his encouragement, men of the greateſt ſcientific eminence were engaged to contribute to its improvement: and they gave us the firſt treatiſes of naval evolutions. But it muſt ever be remembered, that our accompliſhed, though miſguided ſovereign, was then reſiding at the court of Louis; that he had formerly acted in concert with the French as a commander and flag officer, and was at this very time aiding them with his knowledge of ſea affairs. In the memorable day at La Hogue, the gallant Ruſſel, obſerving one of Tourville's movements, exclaimed, "There! they have got Pepys * among them." This anecdote we give on the authority of a friend, who heard an old and reſpectable officer (Admiral Clinton) ſay, that he had it from a gentleman who was in the action, and heard the words ſpoken; and we truſt that our readers will not be diſpleaſed at having this matter of general opinion eſtabliſhed on ſome good grounds.

* Pepys was ſecretary to the duke of York.

5 Wonderful ſimplicity of his ſyſtem;

It was on this occaſion, then, that the duke of York made the movements and evolutions of a fleet the object of his particular ſtudy, reduced them to a ſyſtem, and compoſed that "Syſtem of Sailing and Fighting Inſtructions," which has ever ſince been conſidered as the code of diſcipline for the Britiſh navy, and which has been adopted by our rivals and neighbours as the foundation of their naval tactics. It does great honour to its author, although its merit will not appear very eminent to a careleſs ſurveyor, on account of that very ſimplicity which conſtitutes its chief excellence. It is unqueſtionably the reſult of much ſagacious reflection and painful combination of innumerable circumſtances, all of which have their influence; and it is remarkable, that although ſucceeding commanders have improved the ſubject by ſeveral ſubordinate additions, no change has to this day been made in its general principles or maxims of evolution.

Till ſome ſuch code be eſtabliſhed, it is evident that ſignals can be nothing but arbitrary and unconnected hieroglyphics, to be learned by rote, and retained by memory, without any exerciſe of the judgement; and the acquiſition of this branch of nautical ſkill muſt be a more irkſome taſk than that of learning the Chineſe writing. But ſuch a code being once ſettled, the character in which it may be expreſſed becomes a matter of rational diſcuſſion.

Accordingly, the ſailing and fighting inſtructions of the duke of York were accompanied by a ſet of ſignals for directing the chief or moſt frequent movements of the fleet. Theſe alſo were contrived with ſo much judgement, and ſuch attention to diſtinctneſs, ſimplicity, and propriety, that there has hardly been any change found neceſſary; and they are ſtill retained in the Britiſh navy as the uſual ſignals in all caſes when we are not anxious to conceal our movements from an enemy.

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6 Yet as an art has ſince his time received conſiderable improvements.

Notwithſtanding this acknowledged merit of the duke of York's ſignals, it muſt be admitted that great improvements have been made on this ſubject, conſidered as an art. The art military has, in the courſe of a century paſt, become almoſt an appropriate calling, and has therefore been made the peculiar ſtudy of its profeſſors. Our rivals the French were ſooner, and more formally placed in this ſituation; and the miniſters of Louis XIV. took infinite and moſt judicious pains to make their military men ſuperior to all others by their academical education. A more ſcientific turn was given to their education, and the aſſiſtance of ſcientific men was liberally given them; and all the nations of Europe muſt acknowledge ſome obligations to them for information on every thing connected with the art of war. They have attended very much to this ſubject, have greatly improved it, and have even introduced a new principle into the art; and by this means have reduced it to the moſt ſimple form of reference to the code of ſailing and fighting inſtructions, by making the ſignals immediately expreſſive, not of orders, but of ſimple numbers. Theſe numbers being prefixed to the various articles of the code of inſtructions, the officer who ſees a ſignal thrown out by the admiral reads the number, and reports it to his captain, perhaps without knowing to what it relates. Thus ſimplicity and ſecrecy, with an unlimited power of variation, are combined. We believe that M. de la Bourdonnais, a brave and intelligent officer, during the war 1758, was the author of this ingenious thought.

We do not propoſe to give a ſyſtem of Britiſh ſignals. This would evidently be improper. But we ſhall ſhow our readers the practicability of this curious language, the extent to which it may be carried, and the methods which may be practiſed in accompliſhing this purpoſe. This may make it an object of attention to ſcientific men, who can improve it; and the young officer will not only be able to read the orders of the commander in chief, but will not be at a loſs, ſhould circumſtances place him in a ſituation where he muſt iſſue orders to others.

Signals may be divided into,

I. Day Signals.

II. Night Signals; and,

III. Signals in a Fog.

They muſt alſo be diſtinguiſhed into, 1. Signals of Evolution, addreſſed to the whole Fleet, or to Squadrons of the fleet, or to Diviſions of theſe ſquadrons. 2. Signals of Movements to be made by particular ſhips; and, 3. Signals of Service, which may be either general or particular.

7 During an engagement the ſignals of the admiral are repeated by frigates ſtationed out of the line.

The great extent of a large fleet, the ſmoke in time of battle, and the ſituation of the commander in chief, who is commonly in the midſt of the greateſt confuſion and hotteſt fire, frequently makes it very difficult for the officers of diſtant ſhips to perceive his ſignals with diſtinctneſs. Frigates, therefore, are ſtationed out of the line, to windward or to leeward, whoſe ſole office it is to obſerve the admiral's ſignals, and inſtantly to repeat them. The eyes of all the ſignal officers in the private ſhips of war are directed to the repeating frigates, as well as to the admiral; and the officers of the repeating frigate, having no other duty, obſerve the admiral inceſ-

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fantly, and, being unembarraſſed by the action, can diſplay the ſignal with deliberation, ſo that it may be very diſtinctly ſeen. Being minutely acquainted with the ſubſtitutions which muſt be made on board the admiral when his maſts and rigging are in diſorder, his (perhaps imperfect) ſignal is exhibited by the repeating frigate in its proper form, ſo as to be eaſily underſtood. And to facilitate this communication, the commanders of the different ſquadrons repeat the ſignals of the commander in chief, and the commanders of diviſion repeat the ſignals of the commanders of their ſquadron.

8 Evolution ſignals are preceded by a ſignal of advertiſement, and accompanied with a directive ſignal.

Every evolution ſignal is preceded by a ſignal of ADVERTISEMENT and PREPARATION, which is general, and frequently by a gun, to call attention; and when all the ſignals have been made which direct the different parts of that evolution, another ſignal is made, which marks the cloſe of the complex ſignal, and divides it from others which may immediately follow it: and as the orders of the commander in chief may relate either to the movements of the whole fleet, thoſe of a ſingle diviſion, or thoſe of certain private ſhips, the EXECUTIVE SIGNAL, which dictates the particular movement, is accompanied by a DIRECTIVE SIGNAL, by which theſe ſhips are pointed out, to which the order is addreſſed.

9 Anſwered by the commander to whom they are addreſſed.

The commander of the ſhip to which any ſignal is addreſſed, is generally required to ſignify by a ſignal (which is general) that he has obſerved it. And if he does not thoroughly underſtand its meaning, he intimates this by another general ſignal. And here it is to be obſerved, that as ſoon as the ſignal is anſwered by the ſhips to which it is addreſſed, it is uſual to haul it down, to avoid the confuſion which might ariſe from others being hoiſted in the ſame place. The order remains till executed, notwithſtanding that the ſignal is hauled down.

10 Annulling ſignal.

It may happen that the commander who throws out the ſignal for any piece of ſervice, ſees reaſons for altering his plan. He intimates this by a general ANNULLING ſignal, accompanying the ſignal already given. This will frequently be more ſimple than to make the ſignals for the movements which would be required for re-eſtabliſhing the ſhips in their former ſituation.

All theſe things are of very eaſy comprehenſion, and require little thought for their contrivance. But when we come to the particular evolutions and movements, and to combine theſe with the circumſtances of ſituation in which the fleet may be at the time, it is evident, that much reflection is neceſſary for framing a body of ſignals which may be eaſily exhibited, diſtinctly perceived, and well underſtood, with little riſk of being miſtaken one for another. We ſhall take notice of the circumſtances which chiefly contribute to give them theſe qualities as we proceed in deſcribing their different claſſes.

I. *Of* DAY SIGNALS.

THESE are made by means of the ſhip's ſails, or by colours of various kinds.

Thoſe made with ſails are but few in number, and are almoſt neceſſarily limited to the ſituation of a fleet at anchor. Thus,

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The following Signals	*uſually ſignify*
Main topgallant ſtayſail hoiſted	Officers and men belonging to the ſhip to come on board.
Fore topſail looſe	To prepare for ſailing.
Main topſail looſe	To unmoor.
Main topſail ſheets hauled home	To weigh.
Main topſail ſheets clewed up, and the yard hoiſted	Annul the former ſignal, and the ſhip to come to an anchor.
Topgallant ſails looſe, and the ſheets flying	Diſcovering ſtrange ſails.
Main-topgallant ſail looſe and hoiſted. Topſail-yard down	Recal ſhips in chaſe.
Mizen topſail hoiſted, and the ſheets clewed up	Moor.

Before we proceed to the deſcription of the ſignals by means of colours, ſuch as FLAGS, BANNERS (or triangular flags), PENDANTS or VANES, we muſt take notice of the obvious diſtinctions of the various diviſions and ſubdiviſions of a fleet, ſo that we may underſtand how the ſame ſignal may be addreſſed to a ſquadron, diviſion, or ſingle ſhip or ſhips. We ſuppoſe it known that a fleet of ſhips of war is diſtributed into three grand diviſions (which we ſhall term *ſquadrons*), called the *van*, *centre*, and *rear*. Theſe denominations have not always a relation to the one being more advanced than the other, either towards the enemy, or in the direction of their courſe.

11 Meaning of the terms van, centre, and rear, in the line of battle at ſea.

In a land army, the poſition of every part is conceived from its reference to the enemy; and the reader, conceiving himſelf as facing the enemy, eaſily underſtands the terms *van*, *centre*, and *rear*, the *right* and *left wing*, &c. But the movements of a ſea army having a neceſſary dependence on the wind, they cannot be comprehended unleſs expreſſed in a language which keeps this circumſtance continually in view. The ſimpleſt and moſt eaſily conceived diſpoſition of a fleet, is that in which it is almoſt indiſpenſably obliged to form in order to engage an enemy. This is a ſtraight line, each ſhip directly ahead of its neighbour, and cloſe hauled. This is therefore called the *line of battle*. In this poſition, the two extremities of the fleet correſpond to the right and left wings of an army. Suppoſe this line to be in the direction eaſt and weſt, the wind blowing from the north-north-weſt, and therefore the fleet on the ſtarboard tack; the ſhips heads are to the weſt, and the weſtermoſt diviſion is undoubtedly the van of the fleet, and the eaſtermoſt diviſion is the rear. And it is in conformity to this arrangement and ſituation that the LIST OF THE FLEET is drawn up. But the ſhips may be on the ſame eaſt and weſt line, cloſe hauled, with their heads to the weſt, but the wind blowing from the ſouth-ſouth-weſt. They muſt therefore be on the larboard tack. The ſame ſhips, and the ſame diviſion, are ſtill, in fact, the van of the fleet. But ſuppoſe the ſhips heads to be to the eaſtward, and that they are cloſe hauled,

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hauled, having the wind from the ſouth-ſouth-eaſt or the north-north-eaſt, the ſhips which were the real van on both tacks in the former ſituation are now, in fact, the rear on both tacks; yet they retain the denomination of the *van ſquadron* of this fleet, and are under the immediate direction of the officer of the ſecond rank, while the other extremity is under the direction of the third officer. This ſubordination therefore is rather an arrangement of rank and precedence than of evolution. It is, however, conſidered as the NATURAL ORDER to which the general ſignals muſt be accommodated. For this reaſon, the diviſion which is denominated *van* in the liſt of this fleet, is *generally* made to lead the fleet when in the line of battle on the ſtarboard tack, and to form the *weathermoſt* column in *the order of ſailing in columns;* and, in general, it occupies that ſtation from which it can moſt eaſily paſs into the place of the leading diviſion on the ſtarboard line of battle ahead. Although this is a technical nicety of language, and may frequently puzzle a landſman in reading an account of naval operations, the reflecting and intelligent reader will ſee the propriety of retaining this mode of conceiving the ſubordinate arrangement of a fleet, and will comprehend the employment of the ſignals which are neceſſary for re-eſtabliſhing this arrangement, or directing the movements while another arrangement is retained.

12 How ſignals are addreſſed to each of theſe diviſions.

This being underſtood, it is eaſy to contrive various methods of diſtinguiſhing every ſhip by the place which ſhe occupies in the fleet, both with reſpect to the whole line, with reſpect to the particular ſquadron, the particular diviſion of that ſquadron, and the particular place in that diviſion. This may be done by a combination of the poſition and colour of the pendants and vanes of each ſhip. Thus the colour of the pendants may indicate the ſquadron, their poſition or maſt on which they are hoiſted may mark the diviſion of that ſquadron, and a diſtinguiſhing vane may mark the place of the private ſhip in her own diviſion. The advantages attending this method are many. In a large fleet it would hardly be poſſible for the commander in chief to find a ſufficient variety of ſingle ſignals to mark the ſhip to which an order is addreſſed, by hoiſting it along with the ſignal appropriated to the intended movement. But by this contrivance one-third part of theſe ſignals of addreſs is ſufficient. It alſo enables the commander in chief to order a general change of poſition by a ſingle ſignal, which otherwiſe would require ſeveral. Thus, ſuppoſe that the fore, main, and mizen maſts, are appropriated (with the proper modifications) for exhibiting the ſignals addreſſed to the van, the centre, and the rear ſquadrons of the fleet, and that a red, a white, and a blue flag, are choſen for the diſtinguiſhing flags of the officers commanding theſe ſquadrons; then, if the commander in chief ſhall hoiſt a red flag at his mizen top-gallant maſt head, it muſt direct the van ſquadron to take the poſition then occupied by the rear ſquadron, the evolution neceſſary for accompliſhing this end being ſuppoſed known by the commander of the ſquadron, who will immediately make the neceſſary ſignals to the ſquadron under his particular direction. In the ſame manner, the diſtinguiſhing ſignal for the leading ſhip of a ſquadron being hoiſted along with the ſignal of addreſs to the whole fleet, and the ſignal for any particular ſervice, will cauſe the three or the nine leading ſhips to execute that order, &c. &c.

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All that has been ſaid hitherto may be conſidered as ſo many preparations for the real iſſuing of orders by the commander in chief. The moſt difficult part of the language remains, viz. to invent a number of ſignals which ſhall correſpond to that almoſt infinite variety of movements and ſervices which muſt be performed.

13 Eſſential qualities of ſignals are diſtinctneſs,

Diſtinctneſs, ſimplicity, and propriety, are the three eſſential qualities of all ſignals. A ſignal muſt be ſome object eaſily ſeen, ſtrongly marked, ſo that it may be readily underſtood, with little riſk of its being miſtaken for another. When made by flags, banners, or pendants, they muſt be of the fulleſt colours, and ſtrongeſt contraſts. The ſhips are frequently at a very great diſtance, ſo that the intervening air occaſions a great degradation of colour. They are ſeen between the eye and a very variable ſky; and in this ſituation, eſpecially in the morning or evening, or a dark day, it is not eaſy to diſtinguiſh one full colour from another, all of them approaching to the appearance of a black. At the diſtance of a very few miles hardly any full colours can be diſtinguiſhed but a ſcarlet and a blue. Red, blue, yellow, and white, are the colours which can be diſtinguiſhed at greater diſtances than any others, and are therefore the only colours admitted as ſignals. Even theſe are ſometimes diſtinguiſhed with difficulty. A yellow is often confounded with a dirty white, and a blue with a red. All other dark colours are found totally unfit. But as theſe afford but a ſmall variety, we muſt combine them in one flag, by making it ſtriped, ſpotted, or chequered, taking care that the oppoſition of colour may be as great as poſſible, and that the pieces of which the flags are made up may not be too minute. Red muſt never be ſtriped nor ſpotted with blue; and the ſtripes, ſpots, or chequers, ſhould never be leſs than one-third of the breadth of the flag. Plate CCCCXCVI. is a ſelection by an officer of experience as a ſet very eaſily recogniſed, and little liable to be confounded. Their colours are repreſented by hatching, in the ſame manner as in heraldry (ſee HERALDRY).

Difference of ſhape, as flags, banners, or pendants, is another diſtinction by which the expreſſion may be varied. And in doing this, we muſt recollect, that in light winds it may be difficult to diſtinguiſh a flag from a banner, as neither are fully diſplayed for want of wind to detach the fly from the ſtaff.

And, laſtly, ſignals may be varied by their poſition, which may be on any lofty and well detached part of the maſts, yards, or rigging.

14 Simplicity,

Simplicity is an eminent property in all ſignals. They are addreſſed to perſons not much accuſtomed to combinations, and who are probably much occupied by other preſſing duties. It were to be wiſhed that every piece of ſervice could be indicated by a ſingle flag. This is peculiarly deſirable with reſpect to the ſignals uſed in time of battle. The rapid ſucceſſion of events on this occaſion call for a multitude of orders from the commander in chief, and his ſhip is frequently clad over with flags and pendants, ſo that it is exceedingly difficult for the ſignal officer of a private ſhip to diſtinguiſh the different groups, each of which make a particular ſignal.

Theſe

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15 and propriety.

These conſiderations are the foundation of a certain *propriety* in ſignals, which directs us to a choice among marks which appear altogether arbitrary. Signals which run any riſk of being confounded, on account of ſome reſemblance, or becauſe their poſition hinders us from immediately perceiving their difference, ſhould be appropriated to pieces of ſervice which are hardly poſſible to be executed, or can hardly be wanted, in the ſame ſituation. No bad conſequence could eaſily reſult though the ſignal for *coming to cloſer action* ſhould reſemble that for *unmooring*, becauſe the preſent ſituation of the ſhips makes the laſt operation impoſſible or abſurd. Such conſiderations direct us to ſelect for battle ſignals, thoſe which are of eaſieſt exhibition, are the moſt ſimple, and have the leaſt dependence on the circumſtance of poſition; ſo that their ſignification may not be affected by the damages ſuſtained in the maſts or rigging of the flag ſhip. Such ſignals as are leſs eaſily ſeen at a diſtance, ſhould be appropriated to orders which can occur only in the middle of the fleet, &c. &c. Signals which are made to the admiral by private ſhips may be the ſame with ſignals of command from the flag ſhip, which will conſiderably diminiſh the number of ſignals perfectly different from each other.

16 By what means ſignals are diſtinctly conveyed,

With all theſe attentions and precautions a ſyſtem of ſignals is at laſt made up, fitted to the code of ſailing and fighting inſtructions. It is accompanied by another ſmall ſet for the duty of convoys. It muſt be engroſſed in two books; one for the officer of the flag ſhip, who is to make the ſignals, and the other is delivered to every private ſhip. In the firſt, the evolutions, movements, and other operations of ſervice, are ſet down in one column, and their correſponding ſignals in another. The firſt column is arranged, either alphabetically, by the diſtinguiſhing phraſe, or ſyſtematically, according to the arrangement of the ſailing and fighting inſtructions. The officer whoſe duty it is to make the ſignals, turns to this column for the order which he is to communicate, and in the other column he finds the appropriated ſignal.

17 and underſtood.

In the other book, which is conſulted for the interpretation of the ſignals, they are arranged in the leading column, either by the flags, or by the places of their exhibition. The firſt is the beſt method, becauſe the derangement of the flag ſhip's maſts and rigging in time of action may occaſion a change in the place of the ſignal.

18 The art of ſignals much improved ſince the publication of the *Tactique Navale*.

The *Tactique Navale* of the Chevalier de Morogues contains a very full and elaborate treatiſe on ſignals. We recommend this work to every ſea-officer, as full of inſtruction. The art of ſignals has been greatly ſimplified ſince the publication of this work, but we cannot but aſcribe much of the improvements to it. We believe that the author is the inventor of that ſyſtematic manner of addreſſing the order or *effective ſignal* to the different ſquadrons and diviſions of the fleet, by which the art of ſignals is made more conciſe, the execution of orders is rendered more ſyſtematic, and the commanders of private ſhips are accuſtomed to conſider themſelves as parts of an army, with a mutual dependence and connection. We are ready enough to acknowledge the ſuperiority of the French in manœuvring, but we affect to conſider this as an imputation on their courage. Nothing can be more unjuſt; and dear-bought experience ſhould long ere now have taught us the value of this ſuperiority. What avails that courage which we would willingly arrogate to ourſelves, if we cannot come to action with our enemy, or muſt do it in a ſituation in which it is almoſt impoſſible to ſucceed, and which needleſsly throws away the lives of our gallant crews? Yet this muſt happen, if our admirals do not make evolutions their careful ſtudy, and our captains do not habituate themſelves, from their firſt hoiſting a pendant, to conſider their own ſhip as connected with the moſt remote ſhip in the line. We cannot think that this view of their ſituation would in the leaſt leſſen the character which they have ſo juſtly acquired, of fighting their ſhip with a courage and firmneſs unequalled by thoſe of any other nation. And we may add, that it is only by ſuch a rational ſtudy of their profeſſion, that the gentleman can be diſtinguiſhed from the mercenary commander of a privateer.

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II. Night Signals.

It is evident, that the communication of orders by night muſt be more difficult and more imperfect than by day. We muſt, in general, content ourſelves with ſuch orders as are neceſſary for keeping the fleet together, by directing the more general movements and evolutions which any change of circumſtances may render neceſſary. And here the diviſion and ſubordinate arrangement of the fleet is of indiſpenſable neceſſity, it being hardly poſſible to particulariſe every ſhip by a ſignal of addreſs, or to ſee her ſituation. The orders are therefore addreſſed to the commanders of the different diviſions, each of whom is diſtinguiſhed by his poop and top-lights, and is in the midſt of, and not very remote from, the ſhips under his more particular charge. Yet even in this unfavourable ſituation, it is frequently neceſſary to order the movements of particular ſhips. Actions during the night are not uncommon. Purſuits and rallyings are ſtill oftener carried on at this time. The common dangers of the ſea are as frequent and more diſaſtrous. The ſyſtem of ſignals therefore is very incomplete till this part be accompliſhed.

Night ſignals muſt be made by guns, or by lights, or by both combined.

19 How gun-ſignals may be varied.

Gun-ſignals are ſuſceptible of variety both in number and in diſpoſition. The only diſtinct variation which can be made in this diſpoſition, is by means of the time elapſed between the diſcharges. This will eaſily admit of three varieties, ſlow, moderate, and quick.—Half-minute guns are as ſlow as can eaſily be liſtened to as appertaining to one ſignal. Quarter-minute guns are much better, and admit of two very diſtinct ſubdiviſions. When the gunners, therefore, are well trained to this ſervice (eſpecially ſince the employment of firelocks for cannon), intervals of 15 or 12 ſeconds may be taken for ſlow firing, 8 or 10 ſeconds for moderate, and 4 or 5 ſeconds for quick firing. If theſe could be reduced one half, and made with certainty and preciſion, the expreſſion would be incomparably more diſtinct. A very ſmall number of firings varied in this way will give a conſiderable number of ſignals. Thus five guns, with the variety of only quick and moderate, will give 20 very diſtinguiſhable ſignals. The ſame principle muſt be attended to here as in the flag ſignals. The moſt ſimple muſt be appropriated to the moſt important orders, ſuch as occur in the worſt weather, or ſuch as are moſt

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moſt liable to be miſtaken. Quick firing ſhould not make part of a ſignal to a very diſtant ſhip, becauſe the noiſe of a gun at a great diſtance is a lengthened ſound, and two of them, with a very ſhort interval, are apt to coaleſce into one long-continued ſound. This mode of varying gun-ſignals by the time muſt therefore be employed with great caution, and we muſt be very certain of the ſteady performance of the gunners.

Note, that a preparatory ſignal or advertiſement that an effective ſignal is to be made, is a very neceſſary circumſtance. It is uſual (at leaſt in hard weather) to make this by a double diſcharge, with an interval of half a ſecond, or at moſt a ſecond.

Gun-ſignals are ſeldom made alone, except in ordinary ſituations and moderate weather; becauſe accident may derange them, and inattention may cauſe them to eſcape notice, and, once made, they are over, and their repetition would change their meaning. They are alſo improper on an enemy's coaſt, or where an enemy's cruiſers or fleets may be expected.

20 Signals by lights.

Signals by lights are either made with LIGHTS ſimply ſo called, i. e. lanthorns ſhown in different parts of the ſhip, or by rockets. Lights may differ by number, and by poſition, and alſo by figure. For the flag ſhip always carrying poop or top-lights, or both, preſents an object in the darkeſt night, ſo that we can tell whether the additional lights are exhibited about the mainmaſt, the foremaſt, the mizenmaſt, &c. And if the lights ſhown from any of theſe ſituations are arranged in certain diſtinguiſhable ſituations in reſpect to each other, the number of ſignals may be greatly increaſed. Thus three lights may be in a vertical line, or in a horizontal line, or in a triangle; and the point of this triangle may be up, or down, or forward, or aft, and thus may have many ſignifications.

Lights are alſo exhibited by falſe fires or rockets: Theſe can be varied by number, and by ſuch differences of appearance as to make them very diſtinguiſhable. Rockets may be with ſtars, with rain fire, or ſimple ſquibs.

21 Theſe two ſpecies of ſignals may be combined.

By varying and combining theſe, a very great number of ſignals may be produced, fully ſufficient to direct every general movement or evolution, or any ordinary and important ſervice. The Chevalier de Morogues has given a ſpecimen of ſuch a ſyſtem of night ſignals, into which he has even introduced ſignals of addreſs or direction to every ſhip of a large fleet; and has alſo given ſignals of number, by which depths of ſoundings, points of the compaſs, and other things of this kind, may be expreſſed both eaſily and diſtinctly. He has made the ſignals by rockets perfectly ſimilar in point of number to thoſe by lanthorns, ſo that the commander can take either; a choice which may have its uſe, becauſe the ſignals by rockets may cauſe the preſence of a fleet to be more extenſively known than may be convenient.

22 General obſervations concerning night ſignals.

The commander in chief will inform the fleet by ſignal, that guns, or perhaps rockets, are not to be uſed that night. This ſignal, at the ſame time, directs the fleet to cloſe the line or columns, that the light ſignals may be better obſerved.

It is indeed a general rule to ſhow as few lights as poſſible; and the commander frequently puts out his own poop and top-lights, only ſhowing them from time to time, that his ſhips may keep around him.

The ſignal lanthorns on board the flag ſhip, and a lanthorn kept in readineſs on board of every private ſhip, to anſwer or acknowledge ſignals from the commander in chief, are all kept in bags, to conceal their lights till the moment they are fixed in their places, and the preparatory or advertiſing ſignal has been made. Naval Signals.

The commander in chief ſometimes orders by ſignal every ſhip to ſhow a light for a minute or two, that he may judge of the poſition of the fleet; and the admiral's ſignal muſt always be acknowledged by thoſe to whom it is addreſſed.

It is of particular importance that the fleet be kept together. Therefore the leading ſhips of the fleet, on either tack, are enjoined to acknowledge the ſignals of the commander in chief by a ſignal peculiar to their ſtation. Thus the commander in chief learns the poſition of the extremities of his fleet.

In framing a ſet of night ſignals, great attention muſt be given to their poſition, that they be not obſcured by the ſails. The nature of the order to be given will frequently determine this. Thus, an order for the rear ſhips to make more ſail, will naturally direct us to exhibit the ſignal at the mizen peek; and ſo of other pieces of ſervice. Lanthorns expoſed in groups, ſuch as triangles, lozenges, &c. are commonly ſuſpended at the corners of large frames of laths, at the diſtance of a fathom at leaſt from each other. Attempts have been made to ſhow lights of different colours; but the riſk of miſtake or failure in the compoſition at the laboratory, makes this rather hazardous. Coloured lanthorns are more certain; but when the glaſſes are made of a colour ſufficiently intenſe, the vivacity of the light (which at no time is very great) is too much diminiſhed. Beſides, the very diſtance changes the colour exceedingly and unaccountably.

III. *Of* SIGNALS *in a* FOG.

THESE can be made only by noiſes, ſuch as the firing of cannon and muſkets, the beating of drums and ringing of bells, &c. Fog ſignals are the moſt difficult to contrive of any, and are ſuſceptible of the leaſt variety. The commander in chief is principally concerned to keep his fleet together; and unleſs ſomething very urgent requires it, he will make no change in his courſe or rate of ſailing. But a ſhift of wind or other cauſes may make this neceſſary. The changes which he will order, it will be prudent to regulate by ſome fixed rule, which is in general convenient. Thus, when a fleet is in the order of ſailing upon a wind, and a fog comes on, the fleet will hold on the ſame courſe. If the wind ſhould come a little more on the beam, the fleet will ſtill keep cloſe to the wind. Certain general rules of this kind being agreed on, no ſignals are neceſſary for keeping the fleet together; and the ſhips can ſeparate or run foul of each other only by difference in their rate of ſailing, or by inaccurate ſteerage. To prevent this, the commander in chief fires a gun from time to time, and the ſhips of the fleet judge of his ſituation and diſtance by the ſound. The commanders of diviſions fire guns, with ſome diſtinction from thoſe of the commander in chief. This both informs the commander in chief of the poſition of his ſquadrons, and enables the private ſhips of each diviſion to keep in the neighbourhood of their own flag ſhip. On board of every private ſhip the drum is beaten, or the bell is chimed, every quarter

23 By obſerving certain general rules ſignals during a fog are in many caſes unneceſſary.

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quarter of an hour, according as the ſhip is on the ſtarboard or larboard tack. By ſuch contrivances, it is never difficult to keep a fleet in very good order when ſailing on a wind. The wind is almoſt always moderate, and the ſhips keep under a very eaſy ſail. It is much more difficult when going large, and ſeparation can be prevented only by the moſt unwearied attention. The greateſt riſk is the falling in with ſtrange ſhips ſteering another courſe.

But evolutions and other movements are frequently indiſpenſable. The courſe muſt be changed by tacking or wearing, and other ſervices muſt be performed. None, however, are admitted but the moſt probable, the moſt ſimple, and the moſt neceſſary.

24 How they are given when neceſſary.

The commander in chief firſt informs the fleet by the *preparatory fog ſignal*, that he is about to order an evolution, and that he is to direct it by *fog ſignals*. This precaution is indiſpenſable to prevent miſtakes. Along with this advertiſing ſignal he makes the ſignal of the movement intended. This not only calls the attention of the fleet, but makes the ſhips prepare for the preciſe execution of that movement. The commanders of diviſions repeat the advertiſing ſignal, which informs their ſhips of their ſituation, and the private ſhips beat their drums or chime their bells. Thus the whole ſhips of the fleet cloſe a little, and become a little better acquainted with their mutual poſition. It is now underſtood that a movement is to be made preciſely a quarter of an hour after the advertiſement. At the expiration of this time, the effective ſignal for this movement is made by the commander in chief, and muſt be inſtantly repeated by the commanders of diviſions, and then the movement muſt be made by each ſhip, according to the ſailing and fighting inſtructions. This muſt be done with the utmoſt attention and preciſion, becauſe it produces a prodigious change in the relative poſition of the ſhips; and even although the good ſenſe of the commander in chief will ſelect ſuch movements for accompliſhing his purpoſe as produce the ſmalleſt alterations, and the leaſt riſk of ſeparation or running foul of each other; it is ſtill extremely difficult to avoid theſe misfortunes. To prevent this as much as poſſible, each ſhip which has executed the movement, or which has come on a courſe thwarting that of the fleet, intimates this by a ſignal properly adapted, often adding the ſignal of the tack on which it is now ſtanding, and even its particular ſignal of recognizance. This is particularly incumbent on the flag ſhips and the leading ſhips of each diviſion.

After a reaſonable interval, the commander in chief will make proper ſignals for bringing the fleet to a knowledge of their reunion in this new poſition.

25 Improper to publiſh a particular account of ſignals.

This muſt ſerve for a general account of the circumſtances which muſt be attended to in framing a code of ſignals. The arbitrary characters in which the language is written muſt be left to the ſagacity of the gentlemen of the profeſſion. It muſt be obſerved, that the ſtratagems of war make ſecrecy very neceſſary. It may be of immenſe hazard if the enemy ſhould underſtand our ſignals. In time of battle it might frequently fruſtrate our attempts to deſtroy them, and at all times would enable them to eſcape, or to throw us into diſorder. Every commander of a ſquadron, therefore, iſſues private ſignals, ſuited to his particular deſtination; and therefore it is neceſſary that our code of ſignals be ſuſceptible of endleſs variations. This is exceedingly eaſy without any increaſe of their number. The commander needs only intimate that ſuch and ſuch a ſignal is ſo and ſo changed in its meaning during his command. Naval Signals.

26 Signals may be made the immediate expreſſions of numbers.

We cannot leave this article without returning to an obſervation which we made almoſt in the beginning, viz. that the ſyſtem of ſignals, or, to ſpeak more properly, the manner of framing this ſyſtem, has received much improvement from the gentlemen of the French navy, and particularly from the moſt ingenious thought of M. de la Bourdonnais, of making the ſignals the immediate expreſſions of *numbers* only, which numbers may be afterwards uſed to indicate any order whatever. We ſhall preſent our readers with a ſcheme or two of the manner in which this may be done for all ſignals, both day, night, and fog. This alone may be conſidered as a ſyſtem of ſignals, and is equally applicable to every kind of information at a diſtance. Without detracting in the ſmalleſt degree from the praiſe due to M. de la Bourdonnais, we muſt obſerve, that this principle of *notation* is of much older date. Biſhop Wilkins, in his Secret and Swift Meſſenger, expreſsly recommends it, and gives ſpecimens of the manner of execution; ſo does Dr Hooke in ſome of his propoſals to the Royal Society. Gaſpar Schottus alſo mentions it in his *Technica Curioſa*; and Kircher, among others of his Curious Projects.

27 M. de la Bourdonnais's method for doing this

M. de la Bourdonnais's method is as follows:

He chooſes pendants for his effective ſignals, becauſe they are the moſt eaſily diſplayed in the proper order. Several pendants, making part of one ſignal, may be hoiſted by one hallyard, being ſtopped on it at the diſtance of four or ſix feet from each other. If it be found proper to throw out another ſignal at the ſame time and place, they are ſeparated by a red pendant without a point. His colours are choſen with judgement, being very diſtinctly recogniſed, and not liable to be confounded with the addreſſing ſignals appropriated to the different ſhips of the fleet. They are,

For N° 1.	Red.	For N° 6.	Red, with blue tail.
2.	White.	7.	White, with blue tail.
3.	Blue.	8.	White, with red tail.
4.	Yellow.	9.	Blue, with yellow tail.
5.	Red, with white tail.	10.	Yellow, with blue tail.

Three ſets of ſuch pendants will expreſs every number under a thouſand, by hoiſting one above the other, and reckoning the uppermoſt hundreds, the next below it tens, and the loweſt units. Thus the number 643 will be expreſſed by a pendant red with blue tail, a yellow pendant below it, and a blue one below the laſt.

This method has great advantages. The ſignals may be hoiſted in any place where beſt ſeen, and therefore the ſignification is not affected by the derangement of the flag ſhip's maſts and rigging. And by appropriating the ſmaller numbers to the battle ſignals, they are more ſimple, requiring fewer pendants.

28 might be rendered much ſimpler by uſing fewer colours.

As this method requires a particular ſet of colours, it has its inconveniences. An admiral is often obliged to ſhift his flag, even in time of action. He cannot eaſily take the colours along with him. It is therefore better to make uſe of ſuch colours as every private ſhip is provided with. One ſet of 11 will do, with the addition

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dition of three, at moſt of four pendants, of ſingular make, to mark 100, 200, 300, 400. Two of theſe flags, one above the other, will expreſs any number under 100, by uſing the 11th as a ſubſtitute for any flag that ſhould be repeated. Thus the 11th flag, along with the flag for eight or for ſix, will expreſs the number 88 or 66, &c. Thus we are able to expreſs every number below 500, and this is ſufficient for a very large code of ſignals.

And in order to diminiſh as much as poſſible the number of theſe compound ſignals, it will be proper that a number of ſingle flag ſignals be preſerved, and even varied by circumſtances of poſition, for orders which are of very frequent occurrence, and which can hardly occur in ſituations where any obſtructions are occaſioned by loſs of maſts, &c. And farther, to avoid all chance of miſtake, a particular ſignal can be added, intimating that the ſignals now exhibited are numerary ſignals; or, which is ſtill better, all ſignals may be conſidered as numerary ſignals; and thoſe which we have juſt now called *ſingle flag ſignals* may be ſet down oppoſite to, or as expreſſing, the largeſt numbers of the code.

This method requires the ſignal of advertiſement, the annulling ſignal, the ſignal of addreſs to the particular ſhip or diviſion, the ſignal of acknowledgement, the ſignal of indiſtinctneſs, of diſtreſs, of danger, and one or two more which, in every method, muſt be employed.

Another method of expreſſing numbers with fewer colours is as follows: Let the flags be A, B, C, D, E, F, and arrange them as follows:

29 Another method of expreſſing numbers by fewer colours,

	A	B	C	D	E	F
	1	2	3	4	5	6
A	7	8	9	10	11	12
B	13	14	15	16	17	18
C	19	20	21	22	23	24
D	25	26	27	28	29	30
E	31	32	33	34	35	36
F	37	38	39	40	41	42

The number expreſſed by any pair of flags is found in the interſection of the horizontal and perpendicular columns. Thus the flag D, hoiſted along with and above the flag F, expreſſes the number 40, &c. In order to expreſs a greater number (but not exceeding 84) ſuppoſe 75, hoiſt the flags $\frac{C}{E}$, which expreſſes 33, or 75 wanting 42, and above them a flag or ſignal G, which alone expreſſes 42.

30 which may be alſo improved.

This method may be ſtill farther improved by arranging the flags thus:

	A	B	C	D	E	F
	1	2	3	4	5	6
A	7	8	9	10	11	12
B	—	13	14	15	16	17
C	—	—	18	19	20	21
D	—	—	—	22	23	24
E	—	—	—	—	25	26
F	—	—	—	—	—	27

In this laſt method the ſignification of the ſignal is totally independent of the poſition of the flags. In whatever parts of the ſhip the flags D and E are ſeen, they expreſs the number 23. This would ſuit battle ſignals.

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Another method ſtill may be taken. Flags hoiſted anywhere on the foremaſt may be accounted units, thoſe on the mainmaſt tens, and thoſe on the mizenmaſt hundreds. Thus numeral ſignals may be made by a ſhip diſmaſted, or having only poles in their place.

31 A third method.

Many other ways may be contrived for expreſſing numbers by colours, and there is great room for exerciſing the judgement of the contriver. For it muſt always be remembered, that theſe ſignals muſt be accompanied with a ſignal by which it is addreſſed to ſome particular ſhip or diviſion of the fleet, and it may be difficult to connect the one with the other, which is perhaps ſhown in another place, and along with other executive ſignals.

32 Advantages of numeral ſignals.

One great advantage of theſe numeral ſignals is, that they may be changed in their ſignification at pleaſure. Thus, in the firſt method, it can be ſettled, that on Sundays the colours A, B, C, D, &c. expreſs the cyphers, 1, 2, 3, 4, &c. but that on Mondays they expreſs the cyphers 0, 1, 2, 3, &c. and on Tueſdays the cyphers 9, 0, 1, 2, &c.; and ſo on through all the days of the week. This mean of ſecrecy is mentioned by Dr Hooke for the coaſt and alarm ſignals, where, by the by, he ſhews a method for conveying intelligence over land very ſimilar to what is now practiſed by the French with their telegraph.

33 Numbers may be alſo expreſſed by night ſignals.

It is equally eaſy to expreſs numbers by night ſignals. Thus M. de la Bourdonnais propoſes, that one diſcharge of a great gun ſhall expreſs 7, and that 1, 2, 3, 4, 5, 6 ſhall be expreſſed by lights. Therefore, to expreſs 24, we muſt fire three guns, and ſhow three lights. This is the moſt perfect of all forms of night and fog ſignals. For both the manner of firing guns and of exhibiting lights may be varied to a ſufficient extent with very few guns or lights, and with great diſtinctneſs.

Thus, for guns. Let F mark the firing of a ſingle gun at moderate intervals, and *ff* a double gun, that is, two diſcharged at the interval of a ſecond. We may expreſs numbers thus:

1	F.
2	F, F.
3	F, F, F.
4	F, F, F, F.
5	F, *ff*.
6	F, F, *ff*.
7	F. *ff*, F.
8	F, *ff*, F, F.
9	F, *ff*, F, *ff*.
10	*ff*.
100, &c.	*ff*, *ff*, or *fff*.

It might be done with fewer guns if the *ff* were admitted as the firſt firing. But it ſeems better to begin always with the ſingle gun, and thus the double gun beginning a ſignal diſtinguiſhes the tens &c.

In like manner, a ſmall number of lights will admit of a great variety of very diſtinct poſitions, which may ſerve for all ſignals to ſhips not very remote from the commander in chief. For orders to be underſtood at a very great diſtance, it will be proper to appropriate the numbers which are indicated by ſignals made with

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rockets. Theſe can be varied in number and kind to a ſufficient extent, ſo as to be very eaſily diſtinguiſhed and underſtood. It is ſufficient to have ſhown how the whole, or nearly the whole, notation of ſignals may be limited to the expreſſion of numbers.

34 Concluding remarks.

We have taken little notice of the ſignals made by private ſhips to the commander in chief. This is a very eaſy buſineſs, becauſe there is little riſk of confounding them with other ſignals. Nor have we ſpoken of ſignals from the flag ſhips whoſe ultimate interpretation is number, as when ſhips are directed to change their courſe ſo many points. Thoſe alſo are eaſily contrived in any of the methods already deſcribed: alſo when a private ſhip wiſhes to inform the commander in chief that foundings are found at ſo many fathoms. In like manner, by numbering the points of the compaſs, the admiral can direct to chace to any one of them, or may be informed of ſtrange ſhips being ſeen in any quarter, and what is their number.

SIGNALS by the Drum, made uſe of, in the exerciſe of the army, inſtead of the word of command, viz.

SIGNALS.	*Operations.*
A ſhort roll,	To caution.
A flam,	To perform any diſtinct thing.
To arms,	To form the line or battalion.
The march,	To advance, except when intended for a ſalute.
The quick march,	To advance quick.
The point of war,	To march and charge.
The retreat,	To retreat.
Drum ceaſing,	To halt.
Two ſhort rolls,	To perform the flank firing.
The dragoon march,	To open the battalion.
The grenadier march,	To form the column.
The troop,	To double diviſions.
The long roll,	To form the ſquare.
The grenadier march,	To reduce the ſquare to the column.
The preparative,	To make ready and fire.
The general,	To ceaſe firing.
Two long rolls,	To bring or lodge the colours.

SIGNATURE, a ſign or mark impreſſed upon any thing, whether by nature or art. Such is the general ſignification of the word; but in the plural number it has been uſed, in a particular ſenſe, to denote thoſe external marks by which phyſiognomiſts and other dabblers in the occult ſciences pretend to diſcover the nature and internal qualities of every thing on which they are found. According to Lavater, every corporeal object is characterized by ſignatures peculiar to itſelf.

The doctrine of ſignatures, like alchemy and aſtrology, was very prevalent during the 15th and 16th centuries; and was conſidered as one of the occult ſciences which conferred no ſmall degree of honour on their reſpective profeſſors. Some of theſe philoſophers, as they thought fit to ſtyle themſelves, maintained that plants, minerals, and animals, but particularly plants, had ſignatures impreſſed on them by the hand of nature, indicating to the adept the *therapeutic* uſes to which they might be applied. Others, ſuch as the myſtic theoſophiſts and chemiſts of that day, proceeded much farther in abſurdity, maintaining that every ſubſtance in nature had either *external* ſignatures immediately diſcernible, or *internal* ſignatures, which, when brought into view by fire or menſtrua, denoted its connection with ſome ſidereal or celeſtial archetype. Of the doctrine of ſignatures, as it relates merely to the therapeutic uſes of plants and minerals, traces are to be found in the works of ſome of the greateſt authors of antiquity; but the celeſtial ſignatures, we believe, were diſcovered only by the moonlight of the monkiſh ages. Pliny informs us *, that the marble called *aphites*, from its being ſpotted like a ſerpent, was diſcovered by thoſe ſpots to be a ſovereign remedy for the bite of that animal; and that the colour of the *hæmatites* or blood-ſtone intimated that it was fit to be employed to ſtop an hemorrhagy; but we do not recollect his attributing the virtues of theſe minerals to a ſidereal or celeſtial influence.

Signature || Sileſia.

* *Hiſt. Nat.* lib. 34.

SIGNATURE, a ſigning of a perſon's name at the bottom of an act or deed written by his own hand.

SIGNATURE, in *Printing*, is a letter put at the bottom of the firſt page at leaſt, in each ſheet, as a direction to the binder in folding, gathering, and collating them. The ſignatures conſiſt of the capital letters of the alphabet, which change in every ſheet; if there be more ſheets than letters in the alphabet, to the capital letter is added a ſmall one of the ſame ſort, as A a, B b; which are repeated as often as neceſſary. In large volumes it is eaſy to diſtinguiſh the number of alphabets, after the firſt three or four, by placing a figure before the ſignature, as 5 B, 6 B, &c.

SIGNET, one of the king's ſeals, made uſe of in ſealing his private letters, and all grants that paſs by bill ſigned under his majeſty's hand: it is always in the cuſtody of the ſecretaries of ſtate.

SIGNET, in *Scots Law*. See LAW, Part III. § 17.

SILENE, CATCHFLY, or *Viſcous Campion*, a genus of plants belonging to the claſs *decandria*, and order *trigynia*; and in the natural ſyſtem arranged under the 22d order, *caryophylleæ*. See BOTANY *Index*.

SILESIA, a duchy of Germany, bounded on the eaſt by Poland; on the weſt, by Bohemia and Lower Luſatia; on the ſouth, by a chain of mountains, and a thicket of conſiderable extent which ſeparates it from Hungary; and to the north, by the marquiſate of Brandenburg and Poland. From north-weſt to ſouth-eaſt it is about 274 miles, and about 100 where broadeſt: but it is much contracted at both ends. Upon the frontiers of this country, to the weſt and ſouth, are very high mountains, and ſome likewiſe in other parts of it. One of the ridges upon the frontiers is ſtyled the *Riphæan Mountains*, another the *Moravian*, another the *Bohemian*, and another the *Hungarian*, *Crapack*, or *Carpathian*. A branch of the Bohemian is called the *Giant Mountains*. The winter on theſe hilly tracts is more ſevere, ſets in ſooner, and laſts longer, than in the low lands. The inhabitants uſe a kind of ſkates when the ſnow is deep, as they do in Carniola. Little or no grain is raiſed in the mountains and ſome ſandy tracts; but the reſt of the country is abundantly fruitful, not only in grain, but fruits, roots, paſture, flax, hops, madder, tobacco, and hemp, yielding alſo ſome wine, with conſiderable quantities of ſilk and honey. In many places are great woods of pines, fir, beech, larch, and other trees, affording tar, pitch, roſin, turpentine, lamp-black, and timber for all uſes. In this country alſo is found marble of ſeveral ſorts, ſome precious ſtones, lime-ſtone, millſtone, pitcoal, turf, vitriol, ſome ſilver ore, copper, lead, iron, and mineral ſprings. Great numbers

Silesia. bers of black cattle and horses are brought hither from Poland and Hungary for sale, those bred in the country not being sufficient; but of sheep, goats, game, and venison, they have great plenty. As for wild beasts, here are lynxes, foxes, weasels, otters, and beavers. The rivers, lakes, and ponds, yield fish of several sorts, particularly sturgeons several ells in length, and salmon. Besides a number of smaller streams to water this country, there is the Oder, which traverses it almost from one end to the other; and the Vistula, which after a pretty long course through it enters Poland. The number of the cities and market-towns is said to be about 200, the county of Glatz included, and that of the villages 5000. The inhabitants, who are computed to be about 1,821,065 are a mixture of Germans, Poles, and Moravians. The language generally spoken is German; but in some places the vulgar tongue is a dialect of the Sclavonic. The states consist of the princes and dukes, and those called *state-lords*, with the nobility, who are immediately subject to the sovereign, and the representatives of the chief cities; but since the country fell under the dominion of the king of Prussia, no diets have been held. The king, however, when he took possession of the country, confirmed all the other privileges of the inhabitants. With respect to religion, not only Protestants, but Papists, Jews, and Greeks, enjoy full liberty of conscience. The greatest part of Silesia lies in the diocese of Breslaw, but some part of it in the Polish dioceses of Posen and Cracow. The bishop of Breslaw stands immediately under the pope with regard to spirituals; but all ecclesiastical benefices, not excepting the see of Breslaw, is in the king's gift. Besides Latin schools, colleges, and seminaries, at Breslaw is an university, and at Lignitz an academy for martial exercises. The principal manufactures here are woollens, linens, and cottons of several sorts, with hats, glass-ware, gunpowder, and iron manufactures. Of these there is a considerable exportation. Accounts are generally kept in rix-dollars, silver groschens, and ducats. With respect to its revolutions and present government, it was long a part of the kingdom of Poland; afterwards it had several dukes and petty princes for its sovereigns, who by degrees became subject to the kings of Bohemia, until at last King Charles IV. incorporated the whole duchy with Bohemia; and thus it continued in the possession of the house of Austria, until the king of Prussia in 1742, taking advantage of the troubles that ensued upon the death of the emperor Charles VI. and pretending a kind of claim, wrested a great part of it, together with the county of Glatz, from his daughter and heiress Maria Theresa, the late empress dowager; so that now only a small part of it is possessed by the house of Austria, and connected with the empire, the rest being governed by the king of Prussia, without acknowledging any sort of dependence on the crown of Bohemia or the empire. For the administration of justice in all civil, criminal, and feudal cases, and such as relate to the revenue, the king of Prussia has established three supreme judicatories, to which an appeal lies from all the inferior ones, and from which, when the sum exceeds 500 rix-dollars, causes may be moved to Berlin. The Lutheran churches and schools are under the inspection of the upper consistories, and those of the Papists under that of the bishop's court at Breslaw; but from both an appeal lies to the tribunal at Berlin. As to the revenue, the excise here is levied only in the walled towns, being on the same footing as in the marquisate of Brandenburg; but in the rest of the country the contributions are fixed, and the same both in peace and war. The several branches of the revenue are under the management of the war and domain offices of Breslaw and Glogau. The whole revenue arising to the king of Prussia from Silesia and the county of Glatz amounts to about four millions of rix-dollars per annum. Silesia || Silius.

Silesia is divided into Upper and Lower, and each of these again into principalities and lordships; of some of which both the property and jurisdiction belong immediately to the sovereign, but of others to his subjects and vassals. In regard to the character of the people, the boors are accounted very dull and stupid; but of those of a higher rank, many have distinguished themselves by their wit and learning, as well as by their military and political talents.

SILESIAN EARTH, in the *Materia Medica*, a fine astringent bole. It is very heavy, of a firm compact texture, and in colour of a brownish yellow. It breaks easily between the fingers, and does not stain the hands; is naturally of a smooth surface, is readily diffusible in water, and melts freely into a butter-like substance in the mouth. It leaves no grittiness between the teeth, and does not ferment with acids. It is found in the perpendicular fissures of rocks near the gold mines in Hungary.

SILICERNIUM, among the Romans, was a feast of a private nature, provided for the dead some time after the funeral. It consisted of beans, lettuces, bread, eggs, &c. These were laid upon the tomb, and they foolishly believed that the dead would come out for the repast. What was left was generally burnt on the stone. The word *silicernium* is derived from *silex* and *cæna*, i. e. "a supper upon a stone." Eating what had thus been provided for the dead, was esteemed a mark of the most miserable poverty. A similar entertainment was made by the Greeks at the tombs of the deceased; but it was usual among them to treat the ghosts with the fragments from the feast of the living. See FUNERAL and INFERIÆ.

SILEX. See FLINT.

SILICEOUS EARTHS. See SILICA, CHEMISTRY *Index*.

SILIUS ITALICUS, CAIUS, an ancient Roman poet, and author of an epic poem in 17 books, which contains an history of the second Punic war, so famous for having decided the empire of the world in favour of the Romans. He was born in the reign of Tiberius, and is supposed to have derived the name of *Italicus* from the place of his birth; but whether he was born at Italica in Spain, or at Corfinium in Italy, which, according to Strabo, had the name of *Italica* given it during the Social war, is a point which cannot be known: though, if his birth had happened at either of these places, the grammarians would tell us, that he should have been called *Italicensis*, and not *Italicus*. When he came to Rome, he applied himself to the bar; and, by a close imitation of Cicero, succeeded so well, that he became a celebrated advocate and most accomplished orator. His merit and character recommended him to the highest offices in the republic, even to the consulship, of which he was possessed when Nero died. He is said to

Silius, Silk.

have been aiding and aſſiſting in accuſing perſons of high rank and fortune, whom that wicked emperor had devoted to deſtruction: but he retrieved his character afterwards by a long and uniform courſe of virtuous behaviour. Veſpaſian ſent him as proconſul into Aſia, where he behaved with clean hands and unblemiſhed reputation. After having thus ſpent the beſt part of his life in the ſervice of his country, he bade adieu to public affairs, reſolving to conſecrate the remainder to polite retirement and the muſes. He had ſeveral fine villas in the country: one at Tuſculum, celebrated for having been Cicero's; and a farm near Naples, ſaid to have been Virgil's, at which was his tomb, which Silius often viſited. Thus Martial compliments him on both theſe accounts:

Silius hæc magni celebrat monumenta Maronis,
Jugera facundi qui Ciceronis habet.
Hæredem Dominumque ſui tumulique lariſque
Non alium mallet nec Maro nec Cicero.

Epigr. 49. lib. xi.

Of Tully's ſeat my Silius is poſſeſs'd,
And his the tomb where Virgil's aſhes reſt.
Could thoſe great ſhades return to chooſe their heir,
The preſent owner they would both prefer.

In theſe retirements he applied himſelf to poetry: led not ſo much by any great force of genius, which would certainly not have ſuffered him to ſtay till life was in the wane and his imagination growing cold, as by his exceeding great love of Virgil, to whoſe memory he paid the higheſt veneration. He has imitated him in his poem; and though he falls infinitely ſhort of him, yet he has diſcovered a great and univerſal genius, which would have enabled him to ſucceed in ſome degree in whatever he undertook.

Having been for ſome time afflicted with an impoſthume, which was deemed incurable, he grew weary of life, to which, in the language of Pliny, he put an end with determined courage.

There have been many editions of Silius Italicus. A neat and correct one was publiſhed at Leipſic in 1696, in 8vo, with ſhort and uſeful notes by Cellarius: but the beſt is that *cum notis integris variorum et Arnoldi Drakenborch.* Traject. ad Rhen. 1717, in 4to.

SILK, a very ſoft, fine, bright thread, the work of an inſect called *bombyx*, or the ſilk worm.

As the ſilk worm is a native of China, the culture of ſilk in ancient times was entirely confined to that country. We are told that the empreſſes, ſurrounded by their women, ſpent their leiſure hours in hatching and rearing ſilk worms, and in weaving tiſſues and ſilk veils. That this example was ſoon imitated by perſons of all ranks, we have reaſon to conclude; for we are informed that the Chineſe, who were formerly clothed in ſkins, in a ſhort time after were dreſſed in veſtments of ſilk. Till the reign of Juſtinian, the ſilk worm was unknown beyond the territories of China, but ſilk was introduced into Perſia long before that period. After the conqueſt of the Perſian empire by Alexander the Great, this valuable commodity was brought into Greece, and thence conveyed to Rome. The firſt of the Roman writers extant by whom ſilk is mentioned, are Virgil and Horace; but it is probable that neither of them knew from what country it was obtained, nor how it was produced. By ſome of the ancients it was ſuppoſed to be a fine down adhering to the leaves of certain trees or flowers. Others imagined it to be a delicate ſpecies of wool or cotton; and even thoſe who had learned that it was the work of an inſect, ſhow by their deſcriptions that they had no diſtinct idea of the manner in which it was formed. Among the Romans, ſilk was deemed a dreſs too expenſive and too delicate for men, and was appropriated wholly to women of eminent rank and opulence. Elagabulus is ſaid to have been the firſt man among the Romans who wore a garment of fine ſilk: Aurelian complained that a pound of ſilk was ſold at Rome for 12 ounces of gold; and it is ſaid he refuſed to give his wife permiſſion to wear it on account of its exorbitant price.

Silk.

1 Opinions of the ancients concerning the nature of ſilk.

For ſeveral centuries the Perſians ſupplied the Roman empire with the ſilks of China. Caravans traverſed the whole latitude of Aſia, in 243 days, from the Chineſe ocean to the ſea-coaſt of Syria, carrying this commodity. Sometimes it was conveyed to the ports of Guzerat and Malabar, and thence tranſported by ſea to the Perſian gulf. The Perſians, with the uſual rapacity of monopoliſts, raiſed the price of ſilk to ſuch an exorbitant height, that Juſtinian, eager not only to obtain a full and certain ſupply of a commodity which was become of indiſpenſable uſe, but ſolicitous to deliver the commerce of his ſubjects from the exactions of his enemies, endeavoured, by means of his ally, the Chriſtian monarch of Abyſſinia, to wreſt ſome portion of the ſilk trade from the Perſians. In this attempt he failed; but when he leaſt expected it, he, by an unforeſeen event, attained, in ſome meaſure, the object which he had in view. Two Perſian monks having been employed as miſſionaries in ſome of the Chriſtian churches, which were eſtabliſhed (as we are informed by Coſmas) in different parts of India, had penetrated into the country of the Seres, or China. There they obſerved the labours of the ſilk worm, and became acquainted with all the arts of man in working up its productions into ſuch a variety of elegant fabrics. The proſpect of gain, or perhaps an indignant zeal, excited by ſeeing this lucrative branch of commerce engroſſed by unbelieving nations, prompted them to repair to Conſtantinople. There they explained to the emperor the origin of ſilk, as well as the various modes of preparing and manufacturing it, myſteries hitherto unknown, or very imperfectly underſtood in Europe; and encouraged by his liberal promiſes, they undertook to bring to the capital a ſufficient number of thoſe wonderful inſects, to whoſe labours man is ſo much indebted. This they accompliſhed, by conveying the eggs of the ſilk worm in a hollow cane. They were hatched by the heat of a dunghill, fed with the leaves of a wild mulberry tree, and they multiplied and worked in the ſame manner as in thoſe climates where they firſt became objects of human attention and care. Vaſt numbers of theſe inſects were ſoon reared in different parts of Greece, particularly in the Peloponneſus. Sicily afterwards undertook to breed ſilk worms with equal ſucceſs, and was imitated, from time to time, in ſeveral towns of Italy. In all theſe places extenſive manufactures were eſtabliſhed and carried on with ſilk of domeſtic production. The demand for ſilk from the eaſt diminiſhed of courſe, the ſubjects of the Greek emperors were no longer obliged to have recourſe to the Perſians for a ſupply of it, and a conſiderable change took place in

2 Brought from China by the Perſians till the time of Juſtinian.

Robertſon's Diſquiſition concerning India, p. 88.

3 Silk worms introduced into Europe by two monks.

Silk. in the nature of the commercial intercourſe between Europe and India.

As ſilk is the production of a worm, it will be firſt neceſſary to give a deſcription of its nature and mode of manufacturing. But before we give any account of the moſt approved methods of managing ſilk worms in Europe, it will be proper to preſent a ſhort deſcription of the methods practiſed in China, the original country of the ſilk worm. Theſe are two: they either permit them to remain at liberty on mulberry trees, or keep them in rooms. As the fineſt ſilk is produced by worms confined in rooms, and as the firſt method is very ſimple, it will ſuffice to deſcribe the ſecond.

4 Method of rearing ſilk worms in China.

To begin with the eggs, which are laid on large ſheets of paper, to which they firmly adhere. The ſheets are hung up on a beam of the room, with the eggs inward, and the windows are opened in the front to admit the wind; but no hempen ropes muſt ever come near the worms or their eggs. After ſome days the ſheets are taken down, rolled up looſely with the eggs inward, and then hung up again, during the ſummer and autumn. At the end of December, or the beginning of January, the eggs are put into cold water, with a little ſalt diſſolved in it. Two days after they take them out, hang them up again, and when dry roll them a little tighter, and encloſe each ſeparately, ſtanding on one end in an earthen veſſel. Some put them into a lye made of mulberry tree aſhes, and then lay them ſome moments in ſnow-water, or elſe hang them up three nights on a mulberry tree to receive the ſnow or rain, if not too violent. The time of hatching them is when the leaves of the mulberry trees begin to open, for they are haſtened or impeded according to the different degrees of heat or cold to which they are expoſed. When they are ready to come forth, the eggs ſwell, and become a little pointed.

The third day before they are hatched, the rolls of paper are taken out of the veſſel, ſtretched out, and hung up with their backs toward the ſun, till they receive a kindly warmth; and then being rolled up cloſe, they are ſet upright in a veſſel in a warm place. This is repeated the next day, and the eggs change to an aſh-gray. They then put two ſheets together, and rolling them cloſe tie the ends.

The third day, towards night, the ſheets are unrolled and ſtretched on a fine mat, when the eggs appear blackiſh. They then roll three ſheets together, and carry them into a pretty warm place, ſheltered from the ſouth wind. The next day the people taking out the rolls, and opening them, find them full of worms like ſmall black ants.

The apartment choſen for ſilk worms is on a dry ground, in a pure air, and free from noiſe. The rooms are ſquare, and very cloſe, for the ſake of warmth; the door faces the ſouth, and is covered with a double mat, to keep out the cold; yet there ſhould be a window on every ſide, that when it is thought neceſſary the air may have a free paſſage. In opening a window to let in a refreſhing breeze, care muſt be taken to keep out the gnats and flies. The room muſt be furniſhed with nine or ten rows of frames, about nine inches one above the other. On theſe they place ruſh hurdles, upon which the worms are fed till they are ready to ſpin; and, to preſerve a regular heat, ſtove fires are placed at the corners of the room, or elſe a warming pan is carried up and down it; but it muſt not have the leaſt flame or ſmoke. Cow-dung dried in the ſun is eſteemed the moſt proper fuel. Silk.

The worms eat equally day and night. The Chineſe give them on the firſt day forty-eight meals, that is, one every half hour; the next thirty; the third day they have ſtill leſs. As cloudy and rainy weather takes away their ſtomach, juſt before their repaſt a wiſp of very dry ſtraw, the flame of which muſt be all alike, is held over the worms to free them from the cold and moiſture that benumbs them, or elſe the blinds are taken from the windows to let in the full day-light.

Eating ſo often haſtens their growth, on which the chief profit of the ſilk worm depends. If they come to maturity in 23 or 25 days, a large ſheet of paper covered with worms, which at their firſt coming from the eggs weigh little more than a drachm, will produce 25 ounces of ſilk; but if not till 28 days, they then yield only 20 ounces; and if they are a month or 40 days in growing, they then produce but ten.

They are kept extremely clean, and are often removed; and when they are pretty well grown, the worms belonging to one hurdle are divided into three, afterwards they are placed on ſix, and ſo on to the number of 20 or more; for being full of humours, they muſt be kept at a due diſtance from each other. The critical moment for removing them is when they are of a bright yellow and ready to ſpin; they muſt be ſurrounded with mats at a ſmall diſtance, which muſt cover the top of the place to keep off the outward air; and becauſe they love to work in the dark. However, after the third day's labour, the mats are taken away from one o'clock till three, but the rays of the ſun muſt not ſhine upon them. They are at this time covered with the ſheets of paper that were uſed on the hurdles.

The cocoons are completed in ſeven days, after which the worm is metamorphoſed into a chryſalis; the cocoons are then gathered, and laid in heaps, having firſt ſet apart thoſe deſigned for propagation upon a hurdle, in a cool airy place. The next care is to kill the moths in thoſe cones which are not to be bored. The beſt way of doing this is to fill large earthen veſſels with cones in layers of ten pounds each, throwing in four ounces of ſalt with every layer, and covering it with large dry leaves like thoſe of the water-lily, and cloſely ſtopping the mouth of the veſſels. But in laying the cones into the veſſels, they ſeparate the long, white, and glittering ones, which yield a very fine ſilk, from thoſe that are thick, dark, and of the colour of the ſkin of an onion, which produce a coarſer ſilk.

5 Deſcription and hiſtory of the ſilk worm.

The ſilk worm is a ſpecies of caterpillar, which, like all others of the ſame claſs, undergoes a variety of changes, that, to perſons who are not acquainted with objects of this kind, will appear to be not a little ſurpriſing.

It is produced from a yellowiſh-coloured egg, about the ſize of a ſmall pin-head, which has been laid by a kind of grayiſh-coloured moth, which the vulgar confound with the butterfly. *The Bee*, N° 72.

Theſe eggs, in the temperature of this climate, if kept beyond the reach of the fire and ſunſhine, may be preſerved during the whole of the winter and ſpring months without danger of hatching: and even in ſummer they may eaſily be prevented from hatching if they be kept in a cool place; but in warmer climates it is

ſcarcely

Silk. ſcarcely poſſible to preſerve them from hatching, even for a few days, or from drying ſo much as to deſtroy them. Hence it is eaſy for a native of Britain to keep the eggs till the food on which the worm is to feed be ready for that purpoſe. When this food is in perfection, the eggs need only be expoſed to the ſun for a day or two, when they will be hatched with great facility.

When the animal is firſt protruded from the egg, it is a ſmall black worm, which is active, and naturally aſcends to the top of the heap in ſearch of food. At this ſtage of his growth the ſilk worm requires to be fed with the youngeſt and moſt tender leaves. On theſe leaves, if good, he will feed very freely for about eight days, during which period he increaſes in ſize to about a quarter of an inch in length. He is then attacked with his firſt ſickneſs, which conſiſts in a kind of lethargic ſleep for about three days continuance; during which time he refuſes to eat, and changes his ſkin, preſerving the ſame bulk. This ſleep being over, he begins to eat again, during five days, at which term he is grown to the ſize of full half an inch in length; after which follows a ſecond ſickneſs in every reſpect like the former.

He then feeds for other five days; during which time he will have increaſed to about three quarters of an inch in length, when he is attacked with his third ſickneſs. This being over, he begins to eat again, and continues to do ſo for five days more, when he is attacked by his fourth ſickneſs, at which time he is arrived at his full growth. When he recovers this ſickneſs, he feeds once more during five days with a moſt voracious appetite; after which he diſdains his food, becomes tranſparent, a little on the yelloviſh caſt, and leaves his ſilky traces on the leaves where he paſſes. Theſe ſigns denote that he is ready to begin his cocoon, and will eat no more.

Thus it appears that the whole duration of the life of the worm, in this ſtate of its exiſtence, in our climate, is uſually about 46 days; 28 of which days he takes food, and remains in his ſick or torpid ſtate 18; but it is to be obſerved, that during warm weather the periods of ſickneſs are ſhortened, and in cold weather lengthened, above the terms here ſpecified. In very hot climates it may be ſaid to live faſter, and ſooner to attain maturity, than in thoſe that are colder. Dr Anderſon informs us, that at Madras the worm undergoes its whole evolutions in the ſpace of 22 days. It appears, however, that it feeds fully as many days in India as in Europe, the difference being entirely occaſioned by ſhortening the period of ſickneſs. The longeſt ſickneſs he had ſeen them experience there did not exceed two days; and during ſummer it only laſts a few hours.

When the worm has attained its full growth, it ſearches about for a convenient place for forming its cocoon, and mounts upon any branches or twigs that are put in its way for that purpoſe. After about two days ſpent in this manner, it ſettles in its place, and forms the cocoon, by winding the ſilk which it draws from its bowels round itſelf into an oblong roundiſh ball. Silk.

During this operation it gradually loſes the appearance of a worm; its length is much contracted, and its thickneſs augmented. By the time the web is finiſhed, it is found to be transformed into an oblong roundiſh ball, covered with a ſmooth ſhelly ſkin, and appears to be perfectly dead. In this ſtate of exiſtence it is called an *aurelia*. Many animals in this ſtate may be often ſeen ſticking on the walls of out-houſes, ſomewhat reſembling a ſmall bean.

In this ſtate it remains for ſeveral days entirely motionleſs in the heart of the cocoon, after which it burſts like an egg hatching, and from that comes forth a heavy dull-looking moth with wings; but theſe wings it never uſes for flying; it only crawls ſlowly about in the place it has been hatched. This creature forces its way through the ſilk covering which the worm had woven, goes immediately in queſt of its mate, after which the female lays her eggs; and both male and female, without taſting food in this ſtage of their exiſtence, die in a very ſhort time.

The ſilk worm, when at its full ſize, is from an inch and a quarter to an inch and a half in length, and about half an inch in circumference. He is either of a milk or pearl colour, or blackiſh; theſe laſt are eſteemed the beſt. His body is divided into ſeven rings, to each of which are joined two very ſhort feet. He has a ſmall point like a thorn exactly above the anus. The ſubſtance which forms the ſilk is in his ſtomach, which is very long, wound up, as it were, upon two ſpindles, as ſome ſay, and ſurrounded with a gum, commonly yelloviſh, ſometimes white, but ſeldom greeniſh. When the worm ſpins his cocoon, he winds off a thread from each of his ſpindles, and joins them afterwards by means of two hooks which are placed in his mouth, ſo that the cocoon is formed of a double thread. Having opened a ſilk worm, you may take out the ſpindles, which are folded up in three plaits, and, on ſtretching them out, and drawing each extremity, you may extend them to near two ells in length. If you then ſcrape the thread ſo ſtretched out with your nail, you ſcrape off the gum, which is very like bees wax, and performs the ſame office to the ſilk it covers as gold leaf does to the ingot of ſilver it ſurrounds, when drawn out by the wire drawer. This thread, which is extremely ſtrong and even, is about the thickneſs of a middling pin.

6 Particular attention ought to be paid to the breed of ſilk worms.

Of ſilk worms, as of moſt other animals, there is a conſiderable variety of breeds, ſome of which are much more hardy, and poſſeſs qualities conſiderably different from others. This is a particular of much importance to be adverted to at the time of beginning to breed theſe creatures in any place; for it will make a great difference in the profit on the whole to the undertaker if he rears a good or a bad ſort (A). This is a department in reſpect to the economy of animals that has been in every

(A) As the ſucceſs of the ſilk manufacture muſt depend on the breed of worms, it is of great conſequence to bring them from thoſe countries where they are reckoned beſt.

Mr Andrew Wright, an ingenious ſilk manufacturer of Paiſley, has given the following directions for conveying the eggs of the ſilk worm from diſtant countries by ſea: As ſoon as the moth has laid her eggs, dry them immediately, and put them into glaſs phials; ſeal them ſo cloſe that damp air or water will not penetrate into them. Put theſe phials that contain the eggs into earthen pots filled with cold water; and as often as the water becomes

warm

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every caſe much leſs adverted to than it deſerves; and in particular with regard to the ſilk worm it has been almoſt entirely overlooked. A few eggs of the ſilk worm can be eaſily tranſported by poſt in a letter from any part of Europe to another, eſpecially during the winter ſeaſon. It would therefore be an eaſy matter for any patriotic ſociety, ſuch as the Society of Arts in London, to obtain a ſpecimen of the eggs from every country in which ſilk is now reared, to put theſe under the care of a perſon who could be depended upon, and who underſtood the management of them, with orders to keep each kind diſtinct from another, and advert to every particular that occurred in their management, ſo as to make a fair eſtimate of their reſpective merits. By theſe means the beſt might be ſelected, and thoſe of inferior value rejected. Forty or fifty of each ſort might be enough for the experiment; but it ought to be repeated ſeveral times before concluſions could be drawn from it that might be altogether relied upon; for it is well known that a variation of circumſtances will make a change in the reſult; and it is by no means certain that the ſame particular would affect thoſe of one breed exactly in the ſame manner as it would do thoſe of a different breed. One may be more hardy with regard to cold, another more delicate in reſpect to food, and ſo on. It is experience alone that can aſcertain the circumſtances here inquired for.

7 The management of ſilk worms muſt be different in different climates;

From the above-mentioned particulars, it is evident, that the management of ſilk worms muſt be very different in hot climates from what is required in thoſe that are colder. At Madras, it appears from Dr Anderſon's experiments that it is very difficult to prevent the eggs from hatching for a very few days, ſo that many generations of them muſt be propagated in one year. "In this hotteſt ſeaſon," ſays he, in a letter to Sir Joſeph Banks, dated July 6. 1791, "the ſhorteſt time I have been able to remark for the whole evolutions of the ſilk worm is 40 days; that is to ſay, ſix days an egg, 22 a worm, 11 a grub in the cocoon, and one a moth or butterfly." Fortunately, where the climate forces forward their production ſo rapidly, nature hath been equally provident of food for their ſubſiſtence; for in theſe regions the mulberry continues to grow and puſh out leaves throughout the whole year.

8 but may be eaſily reared in temperate climes.

Though the ſilk worm be a native of China, there is no doubt but it might eaſily be propagated perhaps in moſt parts of the temperate zones. The eggs of this inſect, indeed, require a conſiderable degree of warmth to hatch them, but they can alſo endure a ſevere froſt. No leſs than 5400lbs of ſilk were raiſed in 1789 in the cold, ſandy territories of Pruſſia. In the province of Pekin, in China, where great quantities of ſilk are fabricated, the winter is much colder than even in Scotland. From the information of ſome Ruſſians who were ſent thither to learn the Chineſe language, we find that Reaumur's thermometer was obſerved from 10 to 15, and even 20 degrees below the freezing point. Nor is it difficult to rear the food of the ſilk worm in a temperate clime. The mulberry-tree is a hardy vegetable, which bears, without injury, the winters of Sweden, and even of Siberia. Of the ſeven ſpecies of the mulberry (ſee MORUS) enumerated by Linnæus, four of theſe (viz. the white, red, black, and Tartarian), there is every reaſon to believe could be reared both in Britain and Ireland. The *white* grows in Sweden; the *red* is abundant round Quebec; the *black* delights in bleak ſituations, expoſed to wind on the ſea ſhore; and the *Tartarian* mulberry is repreſented as growing in the chilly regions of Siberia.

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9 Whether any ſpecies of mulberry tree be ſuperior to others.

As to the ſuperior qualities of the different ſpecies, probably there is very little to be pointed out amongſt the four juſt mentioned with regard to nouriſhment, except what may be drawn from the following fact: that if the firſt three are laid down together, the ſilk worm will firſt eat the white, then the red, and next the black, in the order of the tenderneſs of the leaves. The Tartarian ſeems to hold as high a place in its eſteem as either the red or black; but all muſt yield to the white, which ſeems to be its natural food.

In Calabria the red mulberry is uſed; in Valencia the white; and in Granada, where excellent ſilk is produced, the mulberries are all black. The white ſeems to proſper very well in a moiſt ſtiff ſoil: the black agrees well with a dry, ſandy, or gravelly ſoil; and the white is moſt luxuriant in a moiſt rich loam.

10 Britain poſſeſſes ſome advantages over warmer countries for raiſing ſilk.

It may juſtly be aſſerted, that Britain poſſeſſes ſome advantages in the raiſing of raw ſilk which are not enjoyed by warmer countries. Even in the ſouth of France, Mr Arthur Young informs us, the mulberry leaves are often nipped by froſt in the bud; but this is ſcarcely ever the caſe with us. It is well known that thunder and lightning are hurtful to the ſilk worm. Now our climate can boaſt that it is almoſt wholly exempted from thoſe dreadful ſtorms of thunder and lightning which prevail ſo much in hot climates. Nature has then furniſhed us with every thing requiſite for the ſilk manufacture; it remains only for us to improve the advantages which we poſſeſs. Let mulberry trees be planted by proprietors of lands, and let a few perſons of ſkill and attention devote their time to the raiſing of ſilk worms. This is an employment that will not interfere with any manufacture already eſtabliſhed; on the contrary, it would afford a reſpectable, a lucrative, and agreeable employment to ladies, or to females in general, who have at preſent too few profeſſions to which they can apply. The ſociety inſtituted at London for the encouragement of arts, manufactures, and commerce, much to their honour, have offered premiums to thoſe who ſhall plant a certain number of mulberry trees.

11 Method of raiſing mulberry-trees in the ſouth of France.

The following method of raiſing mulberry trees from ſeed is practiſed in the ſouth of France, and has been repeated with ſucceſs in the Eaſt Indies by Dr Anderſon of Madras. "Take the ripe berries of the mulberry when it is full of juice and of ſeeds. Next take a rough horſe-hair line or rope, ſuch as we dry linen on, and with a good handful of ripe mulberries run your hand along the line bruiſing the berries and maſhing them

Bee, N° 156.

Letters on the Culture of Raw Silk on the Coaſt of Coromandel.

warm renew it. Place the earthen veſſels in the coldeſt place of the ſhip, and let them remain until the end of the voyage. It muſt be obſerved, that the ſhip choſen for this purpoſe ought to be one that would arrive in Britain in the months of June or July.

Silk. them as much as poſſible as your hand runs along, ſo that the pulp and ſeeds of the berries may adhere in great abundance to the rope or hair line. Next dig a trench in the ground where you wiſh to plant them, much like what is practiſed in kitchen gardens in England for crops of various kinds. Next cut the rope or hair line into lengths according to the length of the trench you think fit to make, and plunge the line full of maſhed berries into the trench, and then cover it over well with earth, always remembering afterwards to water it well, which is eſſential to the ſucceſs. The ſeeds of the berries thus ſown will grow, and ſoon ſhoot out young ſuckers, which will bear young leaves, which are the beſt food for the ſilk worm.

"The facility and rapidity with which young leaves may by this means be produced is evident, for as many rows of trenches may thus be filled as can be wiſhed; and it can never be neceſſary to have mulberry trees higher than our raſpberries, currants, or gooſeberry buſhes. Whenever they get beyond that, they loſe their value; and if theſe trenches ſucceed, you may have a ſupply coming freſh up day after day, or any quantity you pleaſe." Thus abundance of theſe trees might be reared. But as mulberry trees are not yet found in abundance in this country, it were to be wiſhed that ſome other food could be ſubſtituted in their place: attempts have accordingly been made by thoſe who have reared ſilk worms, and it has been found poſſible to ſupport the ſilk worm upon lettuce (B).

Bee, N° 7. 12 Miſs Rhodes fed ſilk worms on lettuce for ſome time.

Miſs Henrietta Rhodes, a lady who has made ſome ſucceſsful experiments on raiſing ſilk worms in England, had found that the ſilk worm could with ſafety be kept on lettuce for ſome time. This is pretty generally known by ladies who have turned their attention to this ſubject; but ſhe found that in general they could not with ſafety be kept upon that food above three weeks. If longer fed upon that plant, the worms for the moſt part die without ſpinning a web at all. She found, however, that they did not always die, but that in ſome caſes they produced very good cocoons, even when fed entirely on lettuce. She therefore with reaſon ſuſpected that the death of the animal muſt be occaſioned by ſome extraneous circumſtance, and not from the poiſonous quality of the food itſelf; the circumſtance ſhe ſuſpected, from ſome incidental obſervations, was the coldneſs of that food; and therefore ſhe thought it was not impoſſible, but if they were kept in a very warm place, while fed on lettuce, they might attain, in all caſes, a due perfection.

13 General Mordaunt ſtill more ſucceſsful.

General Mordaunt having been informed of this conjecture, reſolved to try the experiment. He got ſome ſilk worms eggs, had them hatched in his hot-houſe, and cauſed them to be all fed upon lettuce and nothing elſe. They proſpered as well as any worms could do, few or none of them died; and they afforded as fine cocoons as if they had been fed upon mulberry leaves. As far as one experiment can go, this affords a very exhilarating proſpect in many points of view. If one kind of food has been noxious, merely on account of an improper temperature, others may be found which have been hurtful only from a ſimilar cauſe; ſo that it is not impoſſible but we may at laſt find that this delicate creature may be ſupported by a variety of kinds of food. Few, however, could be more eaſily obtained than lettuce; and this plant, when cabbaged (the coſs, or ice lettuce eſpecially), would poſſeſs one quality that the mulberry leaf never can poſſeſs, from the want of which many millions of worms die in thoſe countries where ſilk is now reared; for it is obſerved, that when the leaves are gathered wet, it is ſcarcely poſſible to preſerve the worms alive for any length of time; ſo that during a continuance of rainy weather many of them are unavoidably cut off; but a lettuce, when cabbaged, reſiſts moiſture. If gathered, even during rain, the heart of it is dry; ſo that if the outer leaves be thrown aſide at that time, the worms would be continued in perfect health. The expence, too, of cultivating and gathering lettuce, would be ſo much leſs than that of gathering mulberry leaves, as to occaſion a ſaving that would be much more than ſufficient to counterbalance the expence of heating the conſervatory, as a little reflection will ſhow.

Silk.

But the great point to be now aſcertained is, whether it is a fact that worms fed on lettuce, if kept in a due temperature, will continue in good health, in general, till they ſhall have perfected their cocoon? One experiment is too little to eſtabliſh this fact with perfect certainty. It would therefore be neceſſary that more experiments ſhould be made on this ſubject.

14 Silk worms ſaid to be fed on dried mulberry leaves.

It is ſaid that Dr Lodovico Bellardi, a learned and ingenious botaniſt of Turin, has, after a number of experiments, diſcovered a new method of feeding ſilk worms, when they are hatched before the mulberry trees have produced leaves, or when it happens that the froſt deſtroys the tender branches. This new method conſiſts in giving the worms dried leaves of the mulberry-tree, One would think that this dry nouriſhment would not be much reliſhed by theſe inſects; but repeated experiments made by our author, prove that they prefer it to any other, and eat it with the greateſt avidity. The mulberry leaves muſt be gathered about the end of autumn, before the froſts commence, in dry weather, and at times when the heat is greateſt. They muſt be dried afterwards in the ſun, by ſpreading them upon large cloths, and laid up in a dry place after they have been reduced to powder. When it is neceſſary to give this powder to the worms, it ſhould be gently moiſtened with a little water, and a thin coat of it muſt be placed around the young worms, which will immediately begin to feed upon it.

15 Proper experiments ought to be made on various vegetables.

We have mentioned all the different kinds of food, which, as far as we have heard, have been tried with any ſucceſs to nouriſh the ſilk worm; not, however, with great confidence, but as experiments which it might be worth while carefully to conſider and perform. We muſt not omit to mention that one perſon, who has had much

(B) It is not improbable, ſays Dr Anderſon, to whoſe valuable work entitled the *Bee*, we have been much indebted in the drawing up of this article, that other kinds of food may be found which will anſwer the ſame purpoſe. The chicorium intybus and common endive might be tried, as they have the ſame lacteſcent quality with the lettuce.

Silk.

much experience in the managing of silk worms, assures us, that the silk produced from any other food than mulberry leaves is of an inferior quality, and that the worms are sickly. We think, however, that there is reason to suspect that the experiment has not been skilfully performed; and therefore, before every other food except mulberry leaves is discarded, the experiment ought to be performed with more attention and care. We know that many animals in a domestic state can live upon food very different from that which supported them when running wild in the fields. Certain it is, however, that every animal, in its state of nature, partakes of a food peculiar to itself, which is rejected by other animals as if it were of a poisonous quality; and it may be mentioned as a curious fact, as well as an admirable instance of the care of that Being who feeds the fowls of heaven, that notwithstanding the numberless insects that prey upon animals and vegetables, the mulberry tree is left untouched by them all, as the exclusive property of the silk worm, the chief of the insect tribe, which toils and spins for the use of man.

16 What situation and apartments proper for these insects.

Having now considered the food proper for the silk worm, we shall next consider what situation is most favourable to them. In the opinion of some persons in this country who have been in the practice of rearing silk worms, they ought always to be kept in a dry place, well sheltered, and possessing a considerable degree of warmth, and which is not exposed to sudden transitions from heat to cold. If the weather be too cold, a small fire must be made: this is of most importance when the worms are ready for spinning. A southern exposure is therefore preferable. Some think light is of great utility to silk worms, others think that they thrive better in the dark. As to what apartments are best accommodated for promoting the health of silk worms, and most convenient for those who have the care of them, they may be various according to the extent of the manufacture or the wealth of the proprietors. Silk worms may be kept in boxes or in shelves. When shelves are to be used, they may be constructed in the following manner: The shelves may be of wicker, ranged at the distance of a foot and a half, and fixed in the middle of the room: their breadth ought to be such, that any person can easily reach to the middle from either side. This is perhaps the simplest and cheapest apparatus for rearing silk worms; but there is another apparatus which may be recommended to those who are anxious to unite some degree of elegance with convenience. This apparatus is the invention of the Rev. George Swayne of Puckle-church, a gentleman who has studied this subject much, in order to find out the way for promoting the culture of silk among the poor. This apparatus, with the description of it, may be found in the Transactions of the Society for encouraging Arts, Manufactures, and Commerce, vol. vii. p. 148. The apparatus consists of a wooden frame four feet two inches high, each side 16 inches and a half wide, divided into eight partitions by small pieces of wood which form grooves, into which the slides run, and are thus easily thrust into or drawn out of the frame. The upper slide in the model sent to the society by Mr Swayne is of paper only, and designed to receive the worms as soon as hatched; the two next are of catgut, the threads about one-tenth of an inch distant from each other: these are for the insects when a little advanced in size: the five lower ones are of wicker work; but, as Mr Swayne afterwards found, netting may be substituted with advantage instead of wicker bottoms. Under each of these, as well as under those of catgut, are sliders made of paper, to prevent the dung of the worms from falling on those feeding below them.

17 Mr Swayne's apparatus described.

Silk.

18 Proper time for hatching silk worms.

The management of silk worms is next to be attended to. The proper time for hatching them is when the leaves of the mulberry are full grown, or nearly so; that as soon as these insects are capable of receiving food they may obtain it in abundance. To attempt to hatch them sooner would be hurtful, as the weather would not be sufficiently warm. Besides, as leaves are necessary to the life of a vegetable, if the young leaves of the mulberry tree are cropped as soon as they are unfolded, the tree will be so much weakened as to be incapable of producing so many leaves as it would otherwise have done; and if this practice be frequently repeated, will inevitably be destroyed.

19 How they ought to be hatched and fed.

When the proper season is arrived, the eggs may be hatched either by the heat of the sun, when it happens to be strong enough, or by placing them in a small room moderately heated by a stove or fire; and after being exposed for six or seven days to a gentle heat, the silk worm issues from the egg in the form of a small black hairy caterpillar. When Mr Swayne's apparatus is used, the worms are to be kept on the drawers with paper bottoms till they are grown so large as not readily to creep through the gauze-bottomed drawers: they are then to be placed on those drawers, where they are to remain till their excrements are so large as not readily to fall through; when this is the case, they must be removed to the drawers with the wicker or netting bottoms, and fed thereon, till they show symptoms of being about to spin. It is scarcely necessary to mention, that the paper slides beneath the gauze and wicker drawers are intended to receive the dung, which should be emptied as often as the worms are fed, at least once a-day; or to direct, that when the worms are fed, the slides are to be first drawn out a considerable way, and the drawers to rest upon them.

20 Wet or damp food produces contagious diseases.

It has been already mentioned, that wet or damp food is exceedingly prejudicial to those insects. It produces contagious and fatal diseases. To prevent the necessity of giving them wet or damp food, attention ought to be paid to the weather, so that when there is an immediate prospect of rain, a sufficient quantity of leaves may be gathered to serve the worms two or three days. In this country, the leaves of the black or red mulberry tree may be preserved good for food, although kept four or five days, by the following method: When new gathered, lay them loosely in glazed earthen vessels, place these in a cold place, well aired, not exposed to drought.

21 Ought to be kept as clean as possible.

The utmost attention must be paid to preserve the place where silk worms are kept as clean as possible: the house or room must be well ventilated, that no noxious vapours be accumulated. By some experiments of M. Faujas de St Fond, which are recorded in his history of Languedoc, it appears that the silk worm is much injured by foul air. All decayed leaves must be removed from them, as it is now well known that they emit bad air in great abundance.

One of the most difficult branches of the management of silk worms has hitherto been the cleaning without bruising

Silk. bruiſing them. To avoid this inconvenience, the peaſants in France and Italy frequently allow the whole litter to remain without ever cleaning them, which is the cauſe of that unwholeſome ſtench that has been ſo often remarked by thoſe who viſit the places for rearing ſilk worms in theſe countries. This difficulty may be effectually removed by providing a net, or, what would be ſtill better, a wire-bottomed frame, wrought into large meſhes like a riddle. Have that made of a ſize exactly ſufficient to cover the wooden box in which the worms are kept. When you mean to ſhift them, ſpread freſh leaves into the wire baſket; and let it down gently over the worms till it comes within their reach. They no ſooner perceive the freſh food than they abandon the rubbiſh below, and creep through the meſhes, ſo as to fix themſelves upon the leaves; then by gently raiſing the freſh baſket, and drawing out the board below (which ought to be made to ſlip out like the ſlip-bottom of a bird's cage), you get off all the excrements and decayed leaves, without incommoding the worms in the ſmalleſt degree; and along with the litter you will draw off an inch or two in depth of the fouleſt mephitic vapours. To get entirely rid of theſe, the board, when thus taken out, ſhould be carried without doors, and there cleaned; and the ſlip-board immediately replaced to receive all the excrements and offals. After it is replaced, the wire frame that had been elevated a little, may be allowed to deſcend to a convenient diſtance above the board without touching it. Thus will there be left a vacant ſpace for the mephitic air to fall below the worms, ſo as to allow them to inhabit a wholeſome region of the atmoſphere.

Bee, N° 95.

22 How they may be cleaned without bruiſing them.

When a freſh ſupply of food is to be given before cleaning, the wire frame ought to be let down as cloſe to the board as can be ſafely done, and another wire-bottomed frame put over it, with freſh leaves, as before deſcribed. When the worms have abandoned that in their turn, let the ſlip-board, together with the lower wire frame, be drawn out and removed, and ſo on as often as neceſſary. To admit of this alternate change, every table, conſiſting of one ſlip-board, ought to have two ſets of wire-bottomed frames of the ſame ſize; the ſlip-board to be always put into its place immediately after it is cleaned, and the wire frames reſerved to be afterwards placed over the other. By this mode of management, it is probable that the worms would be ſaved from the diſeaſes engendered by the mephitic air, and the numerous deaths that are the conſequence of it avoided. Silk.

Dr Anderſon, to whom we have already acknowledged our obligations, and to whom this country has been much indebted for valuable works on agriculture, the fiſheries, &c. adviſes thoſe who have the management of ſilk worms to ſtrew a thin ſtratum of freſh ſlaked quicklime upon the ſlip-board each time it is cleaned, immediately before it is put into its place. This would abſorb the mephitic gas, for as ſoon as it is generated it would deſcend upon the ſurface of the quicklime. Thus would the worms be kept continually in an atmoſphere of pure air (c). Were the walls of the apartments to be frequently waſhed with quicklime and water, it would tend much to promote cleanlineſs at a ſmall expence, and augment the healthineſs of the worms as well as that of the perſons who attend them.

23 Quicklime would abſorb all the bad air which ſurrounds them.

When the ſilk worm refuſes its food, and leaves ſilky traces on the leaves over which it paſſes, it is a proof that it is ready to begin its cocoon. It is now neceſſary to form a new receptacle, which is commonly done by pinning together papers in the ſhape of inverted cones with broad baſes. "This method (ſays Mr Swayne), where there are many worms, is exceedingly tedious, waſtes much paper, and uſes a large number of pins; beſides, as the ſilk worm always weaves an outer covering or defenſive web before it begins the cocoon or oval ball, I apprehended that it cauſed a needleſs waſte of ſilk in forming the broad web at the top. The method I make uſe of is, to roll a ſmall piece of paper (an uncut octavo leaf, ſuch as that of an old magazine, is ſufficient for three), round my fore-finger, and to give it a twiſt at the bottom; which is done with the utmoſt expedition, and gives no occaſion for the uſe of pins. Theſe rolled paper-caſes being likewiſe of a form more nearly reſembling that of a cocoon, with a much narrower opening on the top than the others, takes away the neceſſity of waſting much ſilk in the outer web, and conſequently leaves more to be employed in forming the ball. The ſilk is readily taken out of theſe caſes by untwiſting the bottom; and if this be done with moderate care, and the papers are preſerved, they will ſerve ſeveral times for the like purpoſe."

24 Mr Swayne's receptacle for the worms, when going to ſpin. *Tranſactions of the Society for the Encouragement of Arts*, vol. vii. p. 123.

Others adviſe, that when the ſilk worms are preparing to ſpin, little buſhes of heath, broom, or twigs, ſhould be

25 Others recommend buſhes of heath.

(c) To put this queſtion beyond a doubt, Mr Blancard made the following comparative experiments, which were ſeveral times repeated. "I procured (ſays he) four glaſs jars nine inches high and five in diameter, cloſing the mouth with cork ſtoppers. After which I placed in each of them, in their ſecond life (ſo *mue* may be tranſlated, which means the ſtage between the different ſickneſſes), twelve ſilk worms, which were fed four times a-day; and which I confined in this kind of priſon all their life, without taking away either their dead companions or their ordure or litter. I ſprinkled with chalk the worms of only two of theſe jars, and kept the two others to compare with them.

"In thoſe without lime, I never obtained either more or leſs than three ſmall and imperfect cocoons (*chiques ou bouffard*), and in the two that were ſprinkled with lime, I had very often twelve, and never leſs than nine fine full-ſized firm cocoons."

This experiment affords the moſt ſatisfactory proof of the utility of this proceſs. From a number of trials he found, that even when the worms were covered with a large proportion of lime, they never were in any way incommoded by it.

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be ſtuck upright near the ſhelf or box in which they are incloſed: the worms mount theſe, and attach their web to them.

26 How ſilk worms may be revived when affected by thunder.

When the worms are ready to mount, in order to ſpin, if the weather be hot, attended with thunder, you will ſee them in a languiſhing condition; your care muſt then be to revive them, which is effected thus: Take a few eggs and onions, and fry them in a pan with ſome ſtale hog's lard, the ranker the better, and make pancake; which done, carry it ſmoaking hot into the room where they are kept, and go round the chamber with it. You will be ſurpriſed to ſee how the ſmell revives them, excites thoſe to eat who have not done feeding, and makes the others that are ready to ſpin climb up the twigs.

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27 Different kinds of cocoons.

In about ten or twelve days, according to the accounts which we have received from Mr Andrew Wright of Paiſley, it may be ſafely concluded, that if the worms have finiſhed their work, the cocoons may be collected.

We ſhall now diſtinguiſh the cocoons from one another according to their value or their uſe, and conſider the method of managing each. They may be diſtinguiſhed into the good and bad. The good cocoons may be known by theſe marks: they are little, ſtrong, and firm; have a fine grain, both ends are round, and they are free from ſpots. Among the good cocoons alſo may be arranged thoſe which are called *calcined* cocoons, in which the worm, in conſequence of ſickneſs, is petrified or reduced to a fine powder. Theſe cocoons produce more ſilk than others, and are ſold in Piedmont at half as much again. They may be diſtinguiſhed by the noiſe which the worm makes when the cocoon is ſhaken. Of the bad cocoons there are ſix ſpecies: 1. The *pointed cocoons*, one extremity of which ends in a point; the ſilk which covers the point is weak, and ſoon breaks or tears. 2. The *cocalons*, which are bigger, but the contexture is weak. 3. The *dupions*, or double cocoons, which have been formed by the joint labour of two and ſometimes of three worms. 4. The *ſoufflons*, which have a looſe contexture, ſometimes ſo looſe that they are tranſparent. 5. The *perforated cocoons*, which have a hole at one end. 6. The *bad choquette*, which is compoſed of defective cocoons, ſpotted or rotten. Beſides theſe there is the *good choquette*, which does not properly belong to either of theſe two claſſes: it is formed of thoſe cocoons in which the worm dies before the ſilk is brought to perfection. The worms adhere to one ſide of the cocoon, and therefore when the cocoon is ſhaken will not rattle: the ſilk is as fine, but is not of ſo bright a colour, nor is ſo ſtrong and nervous, as that which is obtained from good cocoons.

28 Mr Wright's inſtructions for ſelecting and preſerving the royal cocoons.

The cocoons which are kept for breeding are called *royal* cocoons. For ſelecting and preſerving theſe, we have been favoured with ſome valuable inſtructions by Mr Wright of Paiſley, which we ſhall preſent to our readers.—The largeſt and beſt cocoons ought to be kept for breed, about an equal number of males and females; the cocoons that contain the former are ſharper pointed at the ends than thoſe that contain the latter. Although it ſhould happen that there are more females than males, little inconvenience or ill conſequences can ariſe from it, as one male will ſerve two or three females, if the time of their coming out of the cocoons anſwer, About 12 or 15 days after they begin to ſpin, the cocoons for breed may be laid on ſheets of white paper; about this time the moth opens for itſelf a paſſage through the end of its cocoon, and iſſues out. When the female has laid her eggs, which on an average may amount to 250, they are ſpread upon ſheets of paper and hung up to dry in ſome place where they may not be expoſed to the heat of the ſun: after being dried they muſt be kept in a cool well-aired place, where neither vapours nor moiſture can reach them. That they may be preſerved from external accidents, as inſects of different kinds will deſtroy them, and mice is their enemy in all the ſtages of their exiſtence, they ſhould be kept in ſtone pots or glaſs bottles with their mouths ſtopped, and there remain until brought out next ſeaſon to be hatched.

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29 How to prepare the cocoons for being wound.

The cocoons from which the ſilk is to be immediately wound muſt be expoſed to the heat of an oven, in order to kill the chryſalis or aurelia, which would otherwiſe eat its way through the cocoon, and render it uſeleſs. The following directions are given for managing this proceſs by one of the firſt ſilk manufactures in Italy.

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Put your cocoons in long ſhallow baſkets, and fill them within an inch of the top. You then cover them up with paper, and put a wrapper over that. Theſe baſkets are to be diſpoſed in an oven, whoſe heat is as near as can be that of an oven from which the bread is juſt drawn after being baked. When your cocoons have remained therein near an hour, you muſt draw them out; and to ſee whether all the worms are dead, draw out a dupion from the middle of your baſket and open it: if the worm be dead, you may conclude all the reſt are ſo; becauſe the contexture of the dupion being ſtronger than that of the other cocoons, it is conſequently leſs eaſy to be penetrated by the heat. You muſt obſerve to take it from the middle of the baſket, becauſe in that part the heat is leaſt perceptible. After you have drawn your baſkets from the oven, you muſt firſt cover each of them with a woollen blanket or rug, leaving the wrapper beſides, and then you pile them above one another. If your baking has ſucceeded, your woollen cover will be all over wet with a kind of dew, the thickneſs of your little finger. If there be leſs, it is a ſign your cocoons have been too much or too little baked. If too much baked, the worm, being over-dried, cannot tranſpire a humour he no longer contains, and your cocoon is then burnt. If not enough baked, the worm has not been ſufficiently penetrated by the heat to diſtil the liquor he contains, and in that caſe is not dead.

You muſt let your baſkets ſtand thus covered five or ſix hours if poſſible, in order to keep in the heat, as this makes an end of ſtifling thoſe worms which might have avoided the firſt impreſſion of the fire. You are likewiſe to take great care to let your cocoons ſtand in the oven the time that is neceſſary; for if they do not ſtand long enough, your worms are only ſtunned for a time and will afterwards be revived. If, on the other hand, you leave them too long in the oven, you burn them: many inſtances of theſe two caſes are frequently to be met with. It is a good ſign when you ſee ſome of the butterflies ſpring out from the cocoons which have been baked, becauſe you may be certain they are not burnt. For if you would kill them all to the laſt worm, you would burn many cocoons which might be more expoſed to the heat than that particular worm.

The next operation is the winding of the ſilk. Before

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fore you begin to wind, you muſt prepare your cocoons as follows:

30 How the ſilk is to be wound from the cocoons.

1. In ſtripping them of that waſte ſilk that ſurrounds them, and which ſerved to faſten them to the twigs. This burr is proper to ſtuff quilts, or other ſuch uſes; you may likewiſe ſpin it to make ſtockings, but they will be coarſe and ordinary.

2. You muſt ſort your cocoons, ſeparating them into different claſſes in order to wind them apart. Theſe claſſes are, the good white cocoons; the good cocoons of all the other colours; the dupions; the cocalons, among which are included the weak cocoons; the good choquette; and, laſtly, the bad choquette. In ſorting the cocoons, you will always find ſome perforated cocoons amongſt them, whoſe worm is already born; thoſe you muſt ſet apart for fleuret. You will likewiſe find ſome ſoufflons, but very few; for which reaſon you may put them among the bad choquette, and they run up into waſte.

The good cocoons, as well white as yellow, are the eaſieſt to wind; thoſe which require the greateſt care and pains are the cocalons; you muſt wind them in cooler water than the others, and if you take care to give them to a good windſter, you will have as good ſilk from them as the reſt. You muſt likewiſe have careful windſters for the dupions and choquettes. Theſe two ſpecies require hotter water than the common cocoons.

The good cocoons are to be wound in the following manner: Firſt, chooſe an open convenient place for your filature, the longer the better, if you intend to have many furnaces and coppers. The building ſhould be high and open on one ſide, and walled on the other, as well to ſcreen you from the cold winds and receive the ſun, as to give a free paſſage to the ſteam of your baſons or coppers.

Theſe coppers or baſons are to be diſpoſed (when the building will admit of it) in a row on each ſide of the filature, as being the moſt convenient method of placing them, for by that means in walking up and down you ſee what every one is about. And theſe baſons ſhould be two and two together, with a chimney between every couple.

Having prepared your reels (which are turned by hands, and require a quick eye), and your fire being a light one under every baſon, your windſter muſt ſtay till the water is as hot as it can be without boiling. When every thing is ready, you throw into your baſons two or three handfuls of cocoons, which you gently bruſh over with a wiſk about ſix inches long, cut ſtumpy like a broom worn out: by theſe means the threads of the cocoons ſtick to the wiſk. You muſt diſengage theſe threads from the wiſk, and purge them by drawing theſe ends with your fingers till they come off entirely clean. This operation is called *la Battue.*

When the threads are quite clear, you muſt paſs four of them (if you will wind fine ſilk) through each of the holes in a thin iron bar that is placed horizontally at the edge of your baſon; afterwards you twiſt the two ends (which conſiſt of four cocoons each) twenty or twenty-five times, that the four ends in each thread may the better join together in croſſing each other, and that your ſilk may be plump, which otherwiſe would be flat.

Your windſter muſt always have a bowl of cold water by her, to dip her fingers in, and to ſprinkle very often the ſaid bar, that the heat may not burn the thread. Silk.

Your threads, when thus twiſted, go upon two iron hooks called rampins, which are placed higher, and from thence they go upon the reel. At one end of the axis of the reel is a cog-wheel, which catching in the teeth of the poſt rampin, moves it from the right to the left, and conſequently the thread that is upon it; ſo that your ſilk is wound on the reel croſsways, and your threads form two hanks of about four fingers broad.

As often as the cocoons you wind are done, or break or diminiſh only, you muſt join freſh ones to keep up the number requiſite, or the proportion; becauſe, as the cocoons wind off, the thread being finer, you muſt join two cocoons half wound to replace a new one: Thus you may wind three new ones and two half wound, and your ſilk is from four to five cocoons.

When you would join a freſh thread, you muſt lay one end on your finger, which you throw lightly on the other threads that are winding, and it joins them immediately, and continues to go up with the reſt. You muſt not wind off your cocoons too bare or to the laſt, becauſe when they are near at an end, the *bairré*, that is, the huſk, joins in with the other threads, and makes the ſilk foul and gouty.

When you have finiſhed your firſt parcel, you muſt clean your baſons, taking out all the ſtriped worms, as well as the cocoons, on which there is a little ſilk, which you firſt open and take out the worm, and then throw them into a baſket by you, into which you likewiſe caſt the looſe ſilk that comes off in making the battue.

You then proceed as before with other two or three handfuls of cocoons; you make a new battue; you purge them, and continue to wind the ſame number of cocoons or their equivalent, and ſo to the end.

As was already mentioned, the windſter muſt always have a bowl of cold water by her, to ſprinkle the bar, to cool her fingers every time ſhe dips them in the hot water, and to pour into her baſon when neceſſary, that is, when her water begins to boil. You muſt be very careful to twiſt your threads a ſufficient number of times, about 25, otherwiſe your ſilk remains flat, inſtead of being round and full; beſides, when the ſilk is not well croſſed, it never can be clean, becauſe a gout or nub that comes from a cocoon will paſs through a ſmall number of theſe twiſts, though a greater will ſtop it. Your thread then breaks, and you paſs what foulneſs there may be in the middle of your reel between the two hanks, which ſerves for a head-band to tie them.

You muſt obſerve that your water be juſt in a proper degree of heat. When it is too hot, the thread is dead, and has no body; when it is too cold, the ends which form the thread do not join well, and form a harſh ill-qualified ſilk.

You muſt change the water in your baſon four times a day for your dupions and choquette, and twice only for good cocoons when you wind fine ſilk; but if you wind coarſe ſilk, it is neceſſary to change it three or four times. For if you were not to change the water, the ſilk would not be ſo bright and gloſſy, becauſe the worm contained

Silk, Silla.

contained in the cocoons foul it very conſiderably. You muſt endeavour to wind as much as poſſible with clear water, for if there are too many worms in it, your ſilk is covered with a kind of duſt which attracts the moth, and deſtroys your ſilk.

You may wind your ſilk of what ſize you pleaſe, from one cocoon to 1000; but it is difficult to wind more than 30 in a thread. The nicety, and that in which conſiſts the greateſt difficulty, is to wind even; becauſe as the cocoon winds off the end is finer, and you muſt then join other cocoons to keep up the ſame ſize. This difficulty of keeping the ſilk always even is ſo great, that (excepting a thread of two cocoons, which we call ſuch) we do not ſay a ſilk of three, of four, or ſix cocoons; but a ſilk of three to four, of four to five, of ſix to ſeven cocoons. If you proceed to a coarſer ſilk, you cannot calculate ſo nicely as to one cocoon more or leſs. We ſay, for example, from 12 to 15, from 15 to 20, and ſo on.

31 What number of worms produce a certain quantity of ſilk.

What number of worms are neceſſary to produce a certain quantity of ſilk has not been aſcertained. And as different perſons who wiſhed to determine this point have had different reſults, the truth ſeems to be, that from various circumſtances the ſame number of worms may produce more ſilk at one time than at another. It is related in the ſecond volume of the Tranſactions of the Society for encouraging Arts, &c. that Mrs Williams obtained nearly an ounce and a half of ſilk from 244 cocoons. Mr Swayne from 50 cocoons procured 100 grains. Miſs Rhodes obtained from 250 of the largeſt cocoons, three quarters of an ounce and a dram. From a paper in the ſecond volume of the American Tranſactions, which we have before referred to in the courſe of this article, we are informed that 150 ounces of good cocoons yield about 11 ounces of ſilk from five to ſix cocoons: if you wind coarſer, ſomething more. But what appears aſtoniſhing, Mr Salvatore Bertezen, an Italian, to whom the Society for encouraging Arts, &c. adjudged their gold medal, raiſed five pounds of excellent ſilk from 12,000 worms.

32 Length of the threads.

The cocoons produce a thread of very unequal length; you may meet with ſome that yield 1200 ells, whilſt others will ſcarcely afford 200 ells. In general, you may calculate the production of a cocoon from 500 to 600 ells in length.

SILK-Loom. See WEAVING.

SILK Worm. See SILK.

SILLA, a large town on the Niger, by which the travels of Mr Park were bounded towards the eaſt. He gives no particular deſcription of the place, which his health and ſpirits permitted him not to ſurvey, but aſſigns the reaſons by which he was induced to proceed no farther. On his arrival, he was allowed to remain under a tree, till it was quite dark, ſurrounded by hundreds of people. But their language was extremely different from the other parts of Bambarra; and he was given to underſtand, that in his progreſs eaſtward, the Bambarra tongue was very little underſtood; and that, on his reaching Jenné, he would find the greater part of the inhabitants accuſtomed to ſpeak a different language. He had now become the prey of ſickneſs, exhauſted with hunger and fatigue, half naked, and without any article of value, to procure for himſelf proviſions, clothes, or lodging, on which account he reſolved to return, finding that to proſecute his journey further in that direction was wholly impracticable. Silla, according to the lateſt map of Africa, is in 14° 48′ N. Lat. and 1° 24′ W. Long.

Silphà ‖ Simancas.

SILPHA, CARRION-BEETLE, a genus of inſects belonging to the order *coleopteræ*. See ENTOMOLOGY *Index*.

SILPHIUM, a genus of plants belonging to the claſs of ſyngeneſia, and to the order of polygamia neceſſaria; and in the natural ſyſtem arranged under the 49th order, *compoſitæ*. See BOTANY *Index*.

SILVER, a well known metallic ſubſtance. For an account of its properties, ſee CHEMISTRY *Index*.

SILVER, Ores of. See MINERALOGY *Index*.

Shell-SILVER, is prepared of the ſhreds of ſilver leaf, or of the leaves themſelves, for the uſe of painters, after the ſame manner as ſhell gold. See *Shell GOLD*.

SILVERING, the covering of any thing with ſilver. It is uſual to ſilver metals, wood, paper, &c. which is performed either with fire, oil, or ſize. Metal-gilders ſilver by the fire; painter-gilders all the other ways. See GILDING.

To ſilver copper or braſs. 1. Cleanſe the metal with aquafortis, by waſhing it lightly, and immediately throwing it into pure water; or by heating it red-hot, and ſcouring it with ſalt and tartar, and pure water, with a ſmall wire bruſh. 2. Diſſolve ſome ſilver in aquafortis, in a broad-bottomed glaſs veſſel, or of glazed earth; then evaporate away the aquafortis over a chaffing diſh of coals. 3. Put five or ſix times its quantity of water, or as much as will be neceſſary to diſſolve it perfectly, on the remaining dry calx; evaporate this water with the like heat; then put more freſh water, and evaporate again; and, if need be, the third time, making the fire towards the latter end ſo ſtrong as to leave the calx perfectly dry, which, if your ſilver is good, will be of a pure white. 4. Take of this calx, common ſalt, cryſtals of tartar, of each a like quantity or bulk, and mixing well the whole compoſition, put the metal into pure water, and take of the ſaid powder with your wet fingers, and rub it well on, till you find every little cavity of the metal ſufficiently ſilvered over. 5. If you would have it richly done, you muſt rub on more of the powder; and, in the laſt place, waſh the ſilvered metal in pure water, and rub it hard with a dry cloth.

SILVERING of Glaſſes. See *FOLIATING of Looking-glaſſes*.

SILURIS, a genus of fiſhes belonging to the order abdominales. See ICHTHYOLOGY *Index*.

SIMANCAS, a village on the eaſtern boundary of the kingdom of Leon in Spain, ſix miles below Valladolid, on the river Giſnerga. Dr Robertſon, in the introduction to his Hiſtory of America, makes mention of it, and it is remarkable for the archives of the kingdoms of Leon and Caſtile, kept in the caſtle. This collection was begun when the kings often reſided at Valladolid, in which city is ſtill the civil and military tribunal for almoſt the whole of Spain to the north of the Tagus. It was thought proper to have thoſe papers kept in the vicinity of that court, for which purpoſe this caſtle was peculiarly fitted, being entirely erected of ſtone. At one period there were two large halls in this office filled with papers reſpecting the firſt ſettlement of the Spaniards in South America. There was likewiſe in the room called the *ancient royal patronage*, a box containing

Simancas ‖ Simon.

containing treaties with England, in which are many letters and treaties between the kings of England and Spain, from the year 1400 to 1600. There was alſo a ſtrong box in the ſame archives, with five locks, which, we are told, has not been opened ſince the time of Philip II. and it is ſuppoſed that it contains the proceſs againſt Philip's ſon Prince Charles. But it appears that ſome of the ſtate papers have been removed to Madrid.

SIMEON *of* DURHAM, the cotemporary of William of Malmſbury, took great pains in collecting the monuments of our hiſtory, eſpecially in the north of England, after they had been ſcattered by the Danes. From theſe he compoſed a hiſtory of the kings of England, from A. D. 616 to 1130; with ſome ſmaller hiſtorical pieces. Simeon both ſtudied and taught the ſciences, and particularly the mathematics at Oxford; and became precentor of the church at Durham, where he died, probably ſoon after the concluſion of his hiſtory, which was continued by John, prior of Hexham, to A. D. 1156.

SIMIA, the MONKEY, a genus of quadrupeds belonging to the claſs of mammalia, and order of primates, in the Linnæan ſyſtem, but by Mr Pennant arranged under the digitated quadrupeds. See MAMMALIA *Index.*

SIMILE, or SIMILITUDE, in *Rhetoric*, a compariſon of two things, which though different in other reſpects, yet agree in ſome one. The difference between a ſimile and compariſon is ſaid to conſiſt in this, that the ſimile properly belongs to whatever we call the quality of a thing, and the compariſon to the quantity. See COMPARISON; and ORATORY, N° 118.

SIMILOR, a name given to an alloy of red copper and zinc, made in the beſt proportions, to imitate ſilver and gold.

SIMON MACCABEUS, a celebrated leader and high-prieſt of the Jews, who, after rendering the moſt important ſervices to his country, was at laſt treacherouſly ſlain by his ſon-in-law. See *the Hiſtory of the* JEWS, N° 15.

SIMON Magus, or the Sorcerer, was a native of Gitton, a village of Samaria. According to the uſual practice of the Aſiatics of that age, he viſited Egypt, and there probably became acquainted with the ſublime myſteries taught in the Alexandrian ſchool, and learned thoſe theurgic or magical operations, by means of which it was believed that men might be delivered from the power of evil demons. Upon his return into his own country, the author of the Clementine Recognitions relates, that he impoſed upon his countrymen by high pretenſions to ſupernatural powers. And St Luke atteſts, that this artful fanatic, uſing ſorcery, had bewitched the people of Samaria, giving out that he was *ſome great one;* and that he obtained ſuch general attention and reverence in Samaria, that the people all gave heed to him from the leaſt to the greateſt, ſaying, "This man is the great power of God."

Enfield's Hiſtory of Philoſophy, vol. ii. p. 161.

By the preaching of Philip the Deacon, he was with other Samaritans converted to the Chriſtian faith, and admitted into the infant church by the ordinance of baptiſm. His converſion, however, ſeems not to have been real; for, upon ſeeing the miraculous effects of the laying on of the apoſtle's hands, he offered them money, ſaying, "Give me alſo this power, that on whomſoever I lay hands he may receive the Holy Ghoſt." He probably thought Peter and John magicians like himſelf, but better ſkilled in the art of deceiving the multitude. Simon.

Being ſharply reproved for this impiety, he ſeems by his anſwer to have been made ſenſible of his ſin; but his repentance, if ſincere, was of ſhort duration. Returning to his former practices of impoſture, he travelled through various provinces of the empire, oppoſing the progreſs of the goſpel; and arriving at Rome, he led aſtray vaſt numbers of people by his pretended miracles. How long he lived in that metropolis of the world, or in what manner he died, we have no accounts that can be fully depended on. The Chriſtian writers tell us, that being raiſed in the air by two dæmons, he was deprived of their ſupport by the prayers of St Peter and St Paul, and falling, broke his legs. By ſome he is thought to have been the perſon mentioned by Suetonius, who, undertaking to fly in the preſence of Nero, fell to the ground with ſuch violence, that his blood ſpurted up to the gallery where the emperor was ſitting,

The ſum of this impoſtor's doctrine, diveſted of allegory, was, that from the Divine Being, as a fountain of light, flow various orders of æons, or eternal natures, ſubſiſting within the plenitude of the divine eſſence; that beyond theſe, in the order of emanation, are different claſſes of intelligences, among the loweſt of which are human ſouls; that matter is the moſt remote production of the emanative power, which, on account of its infinite diſtance from the Fountain of Light, poſſeſſes ſluggiſh and malignant qualities, which oppoſe the divine operations, and are the cauſe of evil; that it is the great deſign of philoſophy to deliver the ſoul from its impriſonment in matter, and reſtore it to that divine light from which it was derived; and that for this purpoſe God had ſent him one of the firſt æons among men. To his wife Helena he alſo aſcribed a ſimilar kind of divine nature, pretending that a female æon inhabited the body of this woman, to whom he gave the name of Ἔννοια, *Wiſdom;* whence ſome Chriſtian fathers have ſaid, that he called her the *Holy Spirit*. He alſo taught the tranſmigration of ſouls, and denied the reſurrection of the body.

SIMON, *Richard*, was born at Dieppe the 15th May 1638. He began his ſtudies among the prieſts of the Oratory in that city, but quitted their ſociety in a ſhort time. From Dieppe he went to Paris, where he made great progreſs in the ſtudy of the oriental languages. Some time afterwards he joined the ſociety of the Oratory again, and became a prieſt of it in 1660. In 1670 he publiſhed ſome pieces of a ſmaller kind. In 1678 his Critical Hiſtory of the Old Teſtament appeared, but was immediately ſuppreſſed by the intrigues of Meſſieurs du Port Royal. It was reprinted the year after, and its excellence ſoon drew the attention of foreigners; an edition of it was accordingly publiſhed at Amſterdam in Latin, and at London in Engliſh.

He died at Dieppe in 1712, at the age of 74.

He certainly poſſeſſed a vaſt deal of learning: his criticiſm is exact, but not always moderate; and there reigns in his writings a ſpirit of novelty and ſingularity which raiſed him a great many adverſaries. The moſt celebrated of theſe were Le Clerc, Voſſius, Jurieu, Du Pin, and Boſſuet. Simon wrote an anſwer to moſt of the

Simon Il Simonides.

the books that were publiſhed againſt him, and diſplays a pride and obſtinacy in his controverſial writings which do him little honour.

He was the author of a great many books. The following are the principal: 1. The Ceremonies of the Jews, tranſlated from the Italian of Leo of Modena, with a ſupplement concerning the ſects of the Carraites and Samaritans. 2. *L'Hiſtoire Critique du Vieux Teſtament*, "The Critical Hiſtory of the Old Teſtament." This is a very important work, and deſerves the attention of every clergyman. He ſometimes, however, deviates from the road of integrity, to ſerve the cauſe of the church of Rome, particularly in his endeavours to prove the uncertainty of the Hebrew language. Theſe paſſages have been very juſtly expoſed and confuted by Dr Campbell, in his ingenious Preliminary Diſſertations to his new Tranſlation of the Goſpels. 3. Critical Hiſtory of the Text of the New Teſtament. 4. Critical Hiſtory of the Verſions of the New Teſtament. 5. Critical Hiſtory of the principal Commentators on the New Teſtament. 6. Inſpiration of the Sacred Books. 7. A tranſlation of the New Teſtament. This book was cenſured by Cardinal Noailles and Boſſuet. 8. The Hiſtory of the riſe and progreſs of Eccleſiaſtical Revenues, which is commended by Voltaire, as is his Critical Hiſtory of the Old Teſtament. It reſulted from a quarrel with a community of Benedictines. 9. A new ſelect Library, which points out the good books in various kinds of literature, and the uſe to be made of them. 10. Critical Hiſtory of the Belief and Cuſtoms of the Nations on the Levant. 11. Critical Letters, &c.

SIMONICAL, is applied to any perſon guilty of ſimony. See SIMONY.

SIMONIDES, the name of ſeveral poets celebrated in antiquity; but by the Marbles it appears that the eldeſt and moſt illuſtrious of them was born in the 55th Olympiad, 538 years B. C. and that he died in his 90th year; which nearly agrees with the chronology of Euſebius. He was a native of Ceos, one of the Cyclades, in the neighbourhood of Attica, and the preceptor of Pindar. Both Plato and Cicero give him the character not only of a good poet and muſician, but ſpeak of him as a perſon of great virtue and wiſdom. Such longevity gave him an opportunity of knowing a great number of the firſt characters in antiquity with whom he was in ſome meaſure connected. It appears in Fabricius, from ancient authority, that Simonides was cotemporary and in friendſhip with Pittacus of Mitylene, Hipparchus tyrant of Athens, Pauſanias king of Sparta, Hiero tyrant of Syracuſe, with Themiſtocles, and with Alevades king of Theſſaly. He is mentioned by Herodotus; and Xenophon, in his Dialogue upon Tyranny, makes him one of the interlocutors with Hiero king of Syracuſe, Cicero alleges, what has often been quoted in proof of the modeſty and wiſdom of Simonides, that when Hiero aſked him for a definition of God, the poet required a whole day to meditate on ſo important a queſtion: at the end of which, upon the prince putting the ſame queſtion to him a ſecond time, he aſked two days reſpite; and in this manner always doubled the delay each time he was required to anſwer it; till at length, to avoid offending his patron by more diſappointments, he frankly confeſſed that he found the queſtion ſo difficult, that the more he meditated upon it, the leſs was his hope of being able to ſolve it. Simonides

In his old age, perhaps from ſeeing the reſpect which money procured to ſuch as had loſt the charms of youth and the power of attaching mankind by other means, he became ſomewhat mercenary and avaricious. He was frequently employed by the victors at the games to write panegyrics and odes in their praiſe, before his pupil Pindar had exerciſed his talents in their behalf: but Simonides would never gratify their vanity in this particular, till he had firſt tied them down to a ſtipulated ſum for his trouble; and upon being upbraided for his meanneſs, he ſaid, that he had two coffers, in one of which he had for many years put his pecuniary rewards; the other was for honours, verbal thanks, and promiſes; that the firſt was pretty well filled, but the laſt remained always empty. And he made no ſcruple to confeſs, in his old age, that of all the enjoyments of life, the love of money was the only one of which time had not deprived him.

He was frequently reproached for this vice; however, he always defended himſelf with good humour. Upon being aſked by Hiero's queen, Whether it was moſt deſirable to be learned or rich? he anſwered, that it was far better to be rich; for the learned were always dependent on the rich, and waiting at their doors; whereas, he never ſaw rich men at the doors of the learned. When he was accuſed of being ſo ſordid as to ſell part of the proviſions with which his table was furniſhed by Hiero, he ſaid he had done it in order "to diſplay to the world the magnificence of that prince and his own frugality." To others he ſaid, that his reaſon for accumulating wealth was, that "he would rather leave money to his enemies after death, than be troubleſome to his friends while living."

He obtained the prize in poetry at the public games when he was fourſcore years of age. According to Suidas, he added four letters to the Greek alphabet; and Pliny aſſigns to him the eighth ſtring of the lyre; but theſe claims are diſputed by the learned.

His poetry was ſo tender and plaintive, that he acquired the cognomen of *Melicertes*, "ſweet as honey;" and the tearful eye of his muſe was proverbial. Dionyſius places him among thoſe poliſhed writers who excel in a ſmooth volubility, and flow on like plenteous and perennial rivers, in a courſe of even and uninterrupted harmony.

It is to Dionyſius that we are indebted for the preſervation of the following fragment of this poet. Danae being by her mercileſs father incloſed in a cheſt, and thrown into the ſea with her child, when night comes on, and a ſtorm ariſes which threatens to overſet the cheſt, ſhe, weeping and embracing the young Perſeus, cries out:

Sweet child! what anguiſh does thy mother know,
Ere cruel grief has taught thy tears to flow!
Amidſt the roaring wind's tremendous ſound,
Which threats deſtruction as it howls around;
In balmy ſleep thou lieſt, as at the breaſt,
Without one bitter thought to break thy reſt.——
The glimm'ring moon in pity hides her light,
And ſhrinks with horror at the ghaſtly ſight.
Didſt thou but know, ſweet innocent! our woes,
Not opiate's pow'r thy eyelids now could cloſe.

Sleep

Simonides || Simoom.

Sleep on, ſweet babe! ye waves in ſilence roll;
And lull, O lull, to reſt my tortur'd ſoul!

There is a ſecond great poet of the name of Simonides recorded on the Marbles, ſuppoſed to have been his grandſon, and who gained, in 478 B. C. the prize in the games at Athens.

SIMONY, is the corrupt preſentation of any one to an eccleſiaſtical beneſice for money, gift, or reward. It is ſo called from the reſemblance it is ſaid to bear o the ſin of Simon Magus, though the purchaſing of holy orders ſeems to approach nearer to his offence. It was by the canon law a very grievous crime: and is ſo much the more odious, becauſe, as Sir Edward Coke obſerves, it is ever accompanied with perjury; for the preſentee is ſworn to have committed no ſimony. However, it was not an offence puniſhable in a criminal way at the common law: it being thought ſufficient to leave the clerk to eccleſiaſtical cenſures. But as theſe did not affect the ſimoniacal patron, nor were efficacious enough to repel the notorious practice of the thing, divers acts of parliament have been made to reſtrain it by means of civil forfeitures; which the modern prevailing uſage, with regard to ſpiritual preferments, calls aloud to be put in execution. The ſtatute 31 Eliz. c. 6. enacts, that if any patron, for money or any other corrupt conſideration or promiſe, directly or indirectly given, ſhall preſent, admit, inſtitute, induct, inſtall, or collate any perſon to an eccleſiaſtical beneſice or dignity, both the giver and taker ſhall forfeit two years value of the beneſice or dignity; one moiety to the king, and the other to any one who will ſue for the ſame. If perſons alſo corruptly reſign or exchange their beneſices, both the giver and taker ſhall in like manner forfeit double the value of the money or other corrupt conſideration. And perſons who ſhall corruptly ordain or licenſe any miniſter, or procure him to be ordained or licenſed (which is the true idea of ſimony), ſhall incur a like forfeiture of forty pounds; and the miniſter himſelf of ten pounds, beſides an incapacity to hold any eccleſiaſtical preferment for ſeven years afterwards. Corrupt elections and reſignations in colleges, hoſpitals, and other eleemoſynary corporations, are alſo puniſhed, by the ſame ſtatute, with forfeiture of the double value, vacating the place or office, and a devolution of the right of election, for that turn, to the crown.

SIMOOM, a hot wind which blows occaſionally in the deſerts of Africa, and probably in other widely extended countries parched in the ſame manner by a vertical ſun. Its effects on the human body are dreadful. If inhaled in any quantity, it produces inſtant ſuffocation, or at leaſt leaves the unhappy ſufferer oppreſſed with aſthma and lowneſs of ſpirits. The approach of this awful ſcourge of God is indicated by a redneſs in the air, well underſtood by thoſe who are accuſtomed to journey through the deſert; and the only refuge which they have from it, is to fall down with their faces cloſe to the ground, and to continue as long as poſſible without drawing in their breath.

Bruce's Travels, vol. iv. p. 559.

Mr Bruce, who, in his journey through the deſert, ſuffered from the ſimoom, gives of it the following graphical deſcription: "At eleven o'clock, while we contemplated with great pleaſure the rugged top of Chiggre, to which we were faſt approaching, and where we were to ſolace ourſelves with plenty of good water, Idris our guide cried out, with a loud voice, Fall upon your faces, for here is the ſimoom. I ſaw from the ſouth-eaſt a haze come, in colour like the purple part of the rainbow, but not ſo compreſſed or thick. It did not occupy twenty yards in breadth, and was about twelve feet high from the ground. It was a kind of bluſh upon the air, and it moved very rapidly; for I ſcarce could turn to fall upon the ground with my head to the northward, when I felt the heat of its current plainly upon my face. We all lay flat on the ground as if dead, till Idris told us it was blown over. The meteor or purple haze which I ſaw was indeed paſſed, but the light air that ſtill blew was of heat to threaten ſuffocation. For my part, I found diſtinctly in my breaſt that I had imbibed a part of it, nor was I free of an aſthmatic ſenſation till I had been ſome months in Italy, at the baths of Poretta, near two years afterwards." Though the ſeverity of this blaſt ſeems to have paſſed over them almoſt inſtantaneouſly, it continued to blow ſo as to exhauſt them till twenty minutes before five in the afternoon, laſting through all its ſtages very near ſix hours, and leaving them in a ſtate of the utmoſt deſpondency.

Simoom || Simplicity.

SIMPLE, ſomething not mixed or compounded; in which ſenſe it ſtands oppoſed to *compound*.

SIMPLE, in the *Materia Medica*, a general name for all herbs or plants, as having each its particular virtue, whereby it becomes a ſimple remedy.

SIMPLICITY IN WRITING. If we examine the writers whoſe compoſitions have ſtood the teſt of ages, and obtained that higheſt honour, "the concurrent approbation of diſtant times and nations," we ſhall find that the character of ſimplicity is the unvarying circumſtance which alone hath been able to gain this univerſal homage from mankind. Among the Greeks, whoſe writers in general are of the ſimple kind, the divineſt poet, the moſt commanding orator, the fineſt hiſtorian, and deepeſt philoſopher, are, above the reſt, conſpicuouſly eminent in this great quality. The Roman writers riſe towards perfection according to that meaſure of ſimplicity which they mingle in their works; indeed they are all inferior to the Greek models. But who will deny that Lucretius, Horace, Virgil, Livy, Terence, Tully, are at once the ſimpleſt and beſt of Roman writers? unleſs we add the noble annaliſt who appeared in after-times; who, notwithſtanding the political turn of his genius, which ſometimes interferes, is admirable in this great quality, and by it far ſuperior to his contemporaries. It is this one circumſtance that hath raiſed the venerable Dante, the father of modern poetry, above the ſucceeding poets of his country, who could never long maintain the local and temporary honours beſtowed upon them; but have fallen under that juſt neglect which time will ever decree to thoſe who deſert a juſt ſimplicity for the florid colourings of ſtyle, contraſted phraſes, affected conceits, the mere trappings of compoſition and Gothic minutiæ. It is this which has given to Boileau the moſt laſting wreath in France, and to Shakeſpeare and Milton in England; eſpecially to the former, whoſe writings contain ſpecimens of perhaps the pureſt and ſimpleſt Engliſh that is anywhere to be found, except in the Bible or Book of Common Prayer. As it appears from theſe inſtances, that ſimplicity is the only univerſal characteriſtic of juſt writing, ſo the ſuperior eminence of the ſacred Scriptures

Simplicity in this quality hath been generally acknowledged. One of the greateſt critics in antiquity, himſelf conſpicuous in the ſublime and ſimple manner, hath borne this teſtimony to the writings of Moſes and St Paul; and by parity of reaſon we muſt conclude, that had he been converſant with the other ſacred writers, his taſte and candour would have allowed them the ſame encomium.

Simplicity || Simpſon.

It hath been often obſerved, even by writers of no mean rank, that the "Scriptures ſuffer in their credit by the diſadvantage of a literal verſion, while other ancient writings enjoy the advantage of a free and embelliſhed tranſlation." But in reality theſe gentlemen's concern is ill placed and groundleſs: for the truth is, "that moſt other writings are impaired by a literal tranſlation; whereas giving only a due regard to the idiom of different languages, the ſacred writings, when literally tranſlated, are then in their full perfection."

Now this is an internal proof, that in all other writings there is a mixture of local, relative, exterior ornament, which is often loſt in the tranſfuſion from one language to another. But the internal beauties, which depend not on the particular conſtruction of tongues, no change of tongue can deſtroy. Hence the Bible preſerves its native beauty and ſtrength alike in every language, by the ſole energy of unadorned phraſe, natural images, weight of ſentiment, and great ſimplicity.

It is in this reſpect like a rich vein of gold, which, under the ſevereſt trials of heat, cold, and moiſture, retains its original weight and ſplendour, without either loſs or alloy; while baſer metals are corrupted by earth, air, water, fire, and aſſimilated to the various elements through which they paſs.

This circumſtance, then, may be juſtly regarded as ſufficient to vindicate the compoſition of the ſacred Scriptures, as it is at once their chief excellence and greateſt ſecurity. It is their excellence, as it renders them intelligible and uſeful to all; it is their ſecurity, as it prevents their being diſguiſed by the falſe and capricious ornaments of vain or weak tranſlators. We may ſafely appeal to experience and fact for the confirmation of theſe remarks on the ſuperior ſimplicity, utility, and excellence, of the ſtyle of the Holy Scripture. Is there any book in the world ſo perfectly adapted to all capacities? that contains ſuch ſublime and exalted precepts, conveyed in ſuch an artleſs and intelligible ſtrain, that can be read with ſuch pleaſure and advantage by the lettered ſage and the unlettered peaſant?

SIMPLOCE. See ORATORY, N° 72.

SIMPSON, THOMAS, profeſſor of mathematics at the royal academy at Woolwich, fellow of the Royal Society, and member of the Royal Academy at Stockholm, was born at Market Boſworth in Leiceſterſhire in 1710. His father, a ſtuff-weaver, taught him only to read Engliſh, and brought him up to his own buſineſs; but meeting with a ſcientific pedlar, who likewiſe practiſed fortune-telling, young Simpſon by his aſſiſtance and advice left off weaving, and profeſſed aſtrology. As he improved in knowledge, however, he grew diſguſted with his pretended art; and renouncing it, was driven to ſuch difficulties for the ſubſiſtence of his family, that he came up to London, where he worked as a weaver, and taught mathematics at his ſpare hours. As his ſcholars increaſed, his abilities became better known, and he publiſhed his Treatiſe on Fluxions, by ſubſcription, in 1737: in 1740, he publiſhed his Treatiſe on the Nature and Laws of Chance; and Eſſays in Speculative and Mixed Mathematics. After theſe appeared his Doctrine of Annuities and Reverſions; Mathematical Diſſertations; Treatiſe on Algebra; Elements of Geometry; Trigonometry, Plane and Spherical; Select Exerciſes; and his Doctrine and Application of Fluxions, which he profeſſes to be rather a new work, than a ſecond edition of his former publication on fluxions. In 1743, he obtained the mathematical profeſſorſhip at Woolwich academy; and ſoon after was choſen a member of the Royal Society, when the preſident and council, in conſideration of his moderate circumſtances, were pleaſed to excuſe his admiſſion-fees, and his giving bonds for the ſettled future payments. At the academy he exerted all his abilities in inſtructing the pupils who were the immediate objects of his duty, as well as others whom the ſuperior officers of the ordnance permitted to be boarded and lodged in his houſe. In his manner of teaching he had a peculiar and happy addreſs, a certain dignity and perſpicuity, tempered with ſuch a degree of mildneſs, as engaged the attention, eſteem, and friendſhip, of his ſcholars. He therefore acquired great applauſe from his ſuperiors in the diſcharge of his duty. His application and cloſe confinement, however, injured his health. Exerciſe and a proper regimen were preſcribed to him, but to little purpoſe: for his ſpirits ſunk gradually, till he became incapable of performing his duty, or even of reading the letters of his friends. The effects of this decay of nature were greatly increaſed by vexation of mind, owing to the haughty and inſulting behaviour of his ſuperior the firſt profeſſor of mathematics. This perſon, greatly his inferior in mathematical accompliſhments, did what he could to make his ſituation uneaſy, and even to depreciate him in the public opinion: but it was a vain endeavour, and only ſerved to depreſs himſelf. At length his phyſicians adviſed his native air for his recovery, and he ſet out in February 1761; but was ſo fatigued by his journey, that upon his arrival at Boſworth, he betook himſelf to his chamber, and grew continually worſe till the day of his death, which happened on the 14th of May, in the 51ſt year of his age.

Simſon.

SIMSON, DR ROBERT, profeſſor of mathematics in the univerſity of Glaſgow, was born in the year 1687 of a reſpectable family, which had held a ſmall eſtate in the county of Lanark for ſome generations. He was, we think, the ſecond ſon of the family. A younger brother was profeſſor of medicine in the univerſity of St Andrew's, and is known by ſome works of reputation, particularly a Diſſertation on the Nervous Syſtem, occaſioned by the Diſſection of a Brain completely Oſſified.

Dr Simſon was educated in the univerſity of Glaſgow under the eye of ſome of his relations who were profeſſors. Eager after knowledge, he made great progreſs in all his ſtudies; and, as his mind did not, at the very firſt openings of ſcience, ſtrike into that path which afterwards ſo ſtrongly attracted him, and in which he proceeded ſo far almoſt without a companion, he acquired in every walk of ſcience a ſtock of information, which, though it had never been much augmented afterwards, would have done credit to a profeſſional man

Simſon. in any of his ſtudies. He became, at a very early period, an adept in the philoſophy and theology of the ſchools, was able to ſupply the place of a ſick relation in the claſs of oriental languages, was noted for hiſtorical knowledge, and one of the moſt knowing botaniſts of his time.

It was during his theological ſtudies, as preparatory for his entering into orders, that mathematics took hold of his fancy. He uſed to tell in his convivial moments how he amuſed himſelf when preparing his exerciſes for the divinity hall. When tired with vague ſpeculation, in which he did not meet with certainty to reward his labours, he turned up a book of oriental philology, in which he found ſomething which he could diſcover to be true or to be falſe, without going out of the line of ſtudy which was to be of ultimate uſe to him. Sometimes even this could not relieve his fatigue. He then had recourſe to mathematics, which never failed to ſatisfy and refreſh him. For a long while he reſtricted himſelf to a very moderate uſe of the cordial, fearing that he would ſoon exhauſt the ſmall ſtock which ſo limited and abſtract a ſcience could yield; till at laſt he found, that the more he learned, a wider field opened to his view, and ſcenes that were inexhauſtible. Becoming acquainted with ſubjects far beyond the elements of the ſcience, and with numbers of names celebrated during that period of ardent reſearch all over Europe, he found it to be a manly and important ſtudy, by which he was as likely to acquire reputation as by any other. About this time, too, a proſpect began to open of making mathematics his profeſſion for life. He then gave himſelf up to it without reſerve.

His original incitement to this ſtudy as a treat, as ſomething to pleaſe and refreſh his mind in the midſt of ſeverer taſks, gave a particular turn to his mathematical ſtudies, from which he never could afterwards deviate. Perſpicuity and elegance are more attainable, and more diſcernible, in pure geometry, than in any other parts of the ſcience of meaſure. To this therefore he chiefly devoted himſelf. For the ſame reaſon he preferred the ancient method of ſtudying pure geometry, and even felt a diſlike to the Carteſian method of ſubſtituting ſymbols for operations of the mind, and ſtill more was he diſguſted with the ſubſtitution of ſymbols for the very objects of diſcuſſion, for lines, ſurfaces, ſolids, and their affections. He was rather diſpoſed in the ſolution of an algebraical problem, where quantity alone was conſidered, to ſubſtitute figure and its affections for the algebraical ſymbols, and to convert the algebraic formula into an analogous geometrical theorem. And he came at laſt to conſider algebraic analyſis as little better than a kind of mechanical knack, in which we proceed without ideas of any kind, and obtain a reſult without meaning, and without being conſcious of any proceſs of reaſoning, and therefore without any conviction of its truth. And there is no denying, that if genuine unſophiſticated taſte alone is to be conſulted, Dr Simſon was in the right: for though it muſt alſo be acknowledged, that the reaſoning in algebra is as ſtrict as in the pureſt geometry of Euclid or Apollonius, the *expert* analyſt has little perception of it as he goes on, and his final equation is not felt by himſelf as the reſult of ratiocination, any more than if he had obtained it by Paſcal's arithmetical mill. This does not in the leaſt diminiſh our admiration of the algebraic analyſis; for its almoſt boundleſs graſp, its rapid and certain procedure, and the delicate metaphyſics and great addreſs which may be diſplayed in conducting it. Such, however, was the ground of the ſtrong bias of Dr Simſon's mind to the analyſis of the ancient geometers. It increaſed as he went forward; and his veneration (we may call it his *love* or *affection*) for the ancient geometry was carried to a degree of idolatry. His chief labours were exerted in efforts to reſtore the works of the ancient geometers; and he has nowhere beſtowed much pains in advancing the modern diſcoveries in mathematics. The noble inventions, for example, of fluxions and of logarithms, by which our progreſs in mathematical knowledge, and in the uſeful application of this knowledge, is ſo much promoted, attracted the notice of Dr Simſon; but he has contented himſelf with demonſtrating their truth on the genuine principles of the ancient geometry. Yet was he very thoroughly acquainted with all the modern diſcoveries; and there are to be ſeen among his papers diſcuſſions and inveſtigations in the Carteſian method, which ſhow him thoroughly acquainted with all the principles, and even expert in the *tours de main*, of the moſt refined ſymbolical analyſis (A).

About the age of 25 Dr Simſon was choſen profeſſor of mathematics in the univerſity of Glaſgow. He went to London immediately after his appointment, and there formed an acquaintance with the moſt eminent men of that bright era of Britiſh ſcience. Among theſe he always mentioned Captain Halley (the celebrated Dr Edmund Halley) with particular reſpect; ſaying, that he had the moſt acute penetration, and the moſt juſt taſte in that ſcience, of any man he had ever known. And, indeed, Dr Halley has ſtrongly exemplified both of theſe in his divination of the work of *Apollonius de Sectione Spatii*, and the 8th book of his *Conics*, and in ſome of the moſt beautiful theorems in Sir Iſaac Newton's *Principia*. Dr Simſon alſo admired the wide and maſterly ſteps which Newton was accuſtomed to take in his inveſtigations, and his manner of ſubſtituting geometrical figures for the quantities which are obſerved in the phenomena of nature. It was from Dr Simſon that the writer of this article had the remark which has been oftener than once repeated in the courſe of this Work, "That the 39th propoſition of the firſt book of the *Principia* was the moſt important propoſition

(A) In 1752 the writer of this article being then his ſcholar, requeſted him to examine an account which he gave him of what he thought a new curve (a conchoid having a circle for its baſe). Dr Simſon returned it next day with a regular liſt of its leading properties, and the inveſtigation of ſuch as he thought his ſcholar would not ſo eaſily trace. In this haſty ſcrawl the lines related to the circle were familiarly conſidered as arithmetical fractions of the radius conſidered as unity. This was before Euler publiſhed his Arithmetic of the Sines and Tangents, now in univerſal uſe.

Simſon. poſition that had ever been exhibited to the phyſico-mathematical philoſopher;" and he uſed always to illuſtrate to his more advanced ſcholars the ſuperiority of the geometrical over the algebraic analyſis, by comparing the ſolution given by Newton of the inverſe problem of centripetal forces, in the 42d propoſition of that book, with the one given by John Bernoulli in the Memoirs of the Academy of Sciences at Paris for 1713. We have heard him ſay, that to his own knowledge Newton frequently inveſtigated his propoſitions in the ſymbolical way, and that it was owing chiefly to Dr Halley that they did not finally appear in that dreſs. But if Dr Simſon was well informed, we think it a great argument in favour of the ſymbolic analyſis, when this moſt ſucceſsful *practical artiſt* (for ſo we muſt call Newton when engaged in a taſk of diſcovery) found it conducive either to diſpatch or perhaps to his very progreſs.

Returning to his academical chair, Dr Simſon diſcharged the duties of a profeſſor for more than 50 years with great honour to the univerſity and to himſelf.

It is almoſt needleſs to ſay, that in his prelections he followed ſtrictly the Euclidian method in elementary geometry. He made uſe of Theodoſius as an introduction to ſpherical trigonometry. In the higher geometry he prelected from his own Conics; and he gave a ſmall ſpecimen of the *linear problems* of the ancients, by explaining the properties, ſometimes of the conchoid, ſometimes of the ciſſoid, with their application to the ſolution of ſuch problems. In the more advanced claſs he was accuſtomed to give Napier's mode of conceiving logarithms, i. e. quantities as generated by motion; and Mr Cotes's view of them, as the ſums of ratiunculæ; and to demonſtrate Newton's lemmas concerning the limits of ratios; and then to give the elements of the fluxionary calculus; and to finiſh his courſe with a ſelect ſet of propoſitions in optics, gnomonics, and central forces. His method of teaching was ſimple and perſpicuous, his elocution clear, and his manner eaſy and impreſſive. He had the reſpect, and ſtill more the affection, of his ſcholars.

With reſpect to his ſtudies, we have already informed the reader that they got an early bias to pure geometry, and to the elegant but ſcrupulous methods of the ancients.

We have heard Dr Simſon ſay, that it was in a great meaſure owing to Dr Halley that he ſo early directed his efforts to the reſtoration of the ancient geometers. He had recommended this to him, as the moſt certain way for him, then a very young man, both to acquire reputation, and to improve his own knowledge and taſte, and he preſented him with a copy of Pappus's Mathematical Collections, enriched with ſome of his own notes. The perſpicuity of the ancient geometrical analyſis, and a certain elegance in the nature of the ſolutions which it affords, eſpecially by means of the local theorems, ſoon took firm hold of his fancy, and made him, with the ſanguine expectation of a young man, direct his very firſt efforts to the recovery of this *in toto;* and the reſtoration of Euclid's Poriſms was the firſt taſk which he ſet himſelf. The accompliſhed geometer knows what a deſperate taſk this was, from the ſcanty and mutilated account which we have of this work in a ſingle paſſage of Pappus. It was an ambition which nothing but ſucceſs could juſtify in ſo young an adventurer. He ſucceeded; and ſo early as 1718 ſeemed to have been in Simſon. complete poſſeſſion of this method of inveſtigation, which was conſidered by the eminent geometers of antiquity as their ſureſt guide through the labyrinths of the higher geometry. Dr Simſon gave a ſpecimen of his diſcovery in 1723 in the Philoſophical Tranſactions. And after this time he ceaſed not from his endeavours to recover that choice collection of Poriſms which Euclid had collected, as of the moſt general uſe in the ſolution of difficult queſtions. What ſome of theſe muſt have been was pointed out to Dr Simſon by the very nature of the general propoſition of Pappus, which he has reſtored. Others were pointed out by the lemmas which Pappus has given as helps to the young mathematician towards their demonſtration. And, being thus in poſſeſſion of a conſiderable number, their mutual relations pointed out a ſort of ſyſtem, of which theſe made a part, and of which the blanks now remained to be filled up.

Dr Simſon, having thus gained his favourite point, had leiſure to turn his attention to the other works of the ancient geometers; and the poriſms of Euclid now had only an occaſional ſhare. The *loci plani* of Apollonius was another taſk which he very early engaged in, and completed about the year 1738. But, after it was printed, he imagined that he had not given the *ipſiſſimæ propoſitiones* of Apollonius, and in the preciſe ſpirit and order of that author. The impreſſion lay by him for ſome years; and it was with great reluctance that he yielded to the intreaties of his mathematical friends, and publiſhed the work, in 1746, with ſome emendations, where he thought he had deviated fartheſt from his author. He quickly repented of this ſcanty conceſſion, and recalled what he could of the ſmall number of copies which he had given to the bookſellers, and the impreſſion again lay by him for years. He afterwards recorrected the work, and ſtill with ſome reluctance allowed it to come abroad as the Reſtitution of Apollonius. The public, however, had not been ſo faſtidious as Dr Simſon, and the work had acquired great celebrity, and he was now conſidered as one of the firſt and the moſt elegant geometers of the age: for, in the mean time, he had publiſhed his Conic Sections, a work of uncommon merit, whether we conſider it as equivalent to a complete reſtitution of the celebrated work of Apollonius Pergæus, or as an excellent ſyſtem of this important part of mathematics. It is marked with the ſame features as the *loci plani*, the moſt anxious ſolicitude to exhibit the very text of Apollonius, even in the propoſitions belonging to the books which had been completely loſt. Theſe could be recovered in no other way but by a thorough knowledge of the preciſe plan propoſed by the author, and by taking it for granted that the author had accurately accompliſhed this plan. In this manner did Viviani proceed in the firſt attempt which was made to reſtore the conics of Apollonius; and he has given us a detail of the proceſs of his conjectures, by which we may form an opinion of its juſtneſs, and of the probability how far he has attained the deſired object. Dr Simſon's view in his performance was ſomething different, deviating a little in this one caſe from his general track. He was not altogether pleaſed with the work of Viviani, even as augmented by the eighth book added by Halley, and his wiſh was to reſtore the ancient original. But, in the mean time, an

Simſon. academical text book for conic ſections was much wanted. He was much diſſatisfied with thoſe in common uſe; and he was not inſenſible of the advantage reſulting from the conſideration of theſe ſections, independent of the cone firſt introduced by Dr Wallis. He therefore compoſed this excellent treatiſe as an elementary book, not to ſuperſede, but to prepare for the ſtudy of Apollonius; and accordingly accommodates it to this purpoſe, and gives ſeveral important propoſitions in their proper places, *expreſsly as reſtitutions of Apollonius*, whom he keeps conſtantly in view through the whole work.

Much about this time Dr Simſon ſeriouſly began to prepare a perfect edition of Euclid's Elements. The intimate acquaintance which he had by this time acquired with all the original works of the ancient geometers, and their ancient commentators and critics, encouraged him to hope that he could reſtore to his original luſtre this leader in mathematical ſcience; and the errors which had crept into this celebrated work, and which ſtill remained in it, appeared of magnitude ſufficient to merit the moſt careful efforts for their removal. The DATA alſo, which were in like manner the introduction to the whole art of geometrical inveſtigation, ſeemed to call more loudly for his amending hand. For it appears that the Saracens, who have preſerved to us the writings of the ancients, have contented themſelves with admiring theſe celebrated works, and have availed themſelves of the knowledge which they contain; but they have ſhown no inclination to add to the ſtock, or to promote the ſciences which they had received. They could not do any thing without the ſynthetical books of the geometers; but, not meaning to go beyond the diſcoveries which they had made, they neglected all the books which related to the analytic art alone, and the greateſt part of them (about 25 out of 30) have irrecoverably periſhed. The data of Euclid have fortunately been preſerved, but the book was neglected, and the only ancient copies, which are but three or four, are miſerably erroneous and mutilated. Fortunately, it is no very arduous matter to reinſtate this work in its original perfection. The plan is preciſe, both in its extent and its method. It had been reſtored, therefore, with ſucceſs by more than one author. But Dr Simſon's comprehenſive view of the whole analytical ſyſtem pointed out to him many occaſions for amendment. He therefore made its inſtitution a joint taſk with that of the elements. All the lovers of true geometry will acknowledge their obligations to him for the edition of the Elements and data which he publiſhed about 1758. The text is corrected with the moſt judicious and ſcrupulous care, and the notes are ineſtimable, both for their information, and for the tendency which they muſt have to form the mind of the ſtudent to a true judgement and taſte in mathematical ſubjects. The more accompliſhed reader will perhaps be ſometimes diſpoſed to ſmile at the axiom which ſeems to pervade the notes, "that a work of Euclid muſt be ſuppoſed without error or defect." If this was not the caſe, Euclid has been obliged to his editor in more inſtances than one. Nor ſhould his greateſt admirers think it impoſſible that in the progreſs of human improvement, a geometrical truth ſhould occur to one of theſe latter days, which eſcaped the notice of even the Lincean Euclid. Such merit, however, Dr Simſon nowhere claims, but lays every blame of error, omiſſion, or obſcurity, to the charge of Proclus, Theon, and other editors and commentators of the renowned Grecian. Simſon.

There is another work of Apollonius on which Dr Simſon has beſtowed great pains, and has reſtored, as we imagine, *omnibus numeris perfectum*, viz. the SECTIO DETERMINATA; one of thoſe performances which are of indiſpenſable uſe in the application of the ancient analyſis. This alſo ſeems to have been an early taſk, though we do not know the date of his labours on it. It did not appear till after his death, being then publiſhed along with the great work, the Poriſms of Euclid, at the expence of the late Earl Stanhope, a nobleman intimately converſant with the ancient geometry, and zealous for its reception among the mathematicians of the preſent age. He had kept up a conſtant correſpondence with Dr Simſon on mathematical ſubjects; and at his death in 1768, engaged Mr Clow profeſſor of logic in the univerſity of Glaſgow, to whoſe care the Doctor had left all his valuable papers, to make a ſelection of ſuch as would ſerve to ſupport and increaſe his well-earned reputation as THE RESTORER of ANCIENT GEOMETRY.

We have been thus particular in our account of Dr Simſon's labours in theſe works, becauſe his manner of execution, while it does honour to his inventive powers, and ſhows his juſt taſte in mathematical compoſition, alſo confirms our former aſſertion, that he carried his reſpect for the ancient geometers to a degree of ſuperſtitious idolatry, and that his fancy, unchecked, viewed them as incapable of error or imperfection. This is diſtinctly to be ſeen in the emendations which he has given of the texts, particularly in his editions of Euclid. Not only every imperfection of the reading is aſcribed to the ignorance of copyiſts, and every indiſtinctneſs in the conception, inconcluſiveneſs in the reaſoning, and defect in the method, is aſcribed to the ignorance or miſtake of the commentators; but it is all along aſſumed that the work was perfect in its kind; and that by exhibiting a perfect work, we reſtore the genuine original. This is ſurely gratuitous; and it is very poſſible that it has, in ſome inſtances, made Dr Simſon fail of his anxious purpoſe, and give us even a better than the original. It has undoubtedly made him fail in what *ſhould have been* his great purpoſe, viz. to give the world a connected ſyſtem of the ancient geometrical analyſis; ſuch as would, in the firſt place, exhibit it in its moſt engaging form, elegant, perſpicuous, and comprehenſive; and, in the next place, ſuch as ſhould engage the mathematicians of the preſent age to adopt it as the moſt certain and ſucceſsful conductor in thoſe laborious and difficult reſearches in which the demands of modern ſcience continually engage them. And this might have been expected, in the province of ſpeculative geometry at leaſt, from a perſon of ſuch extenſive knowledge of the properties of figure, and who had ſo eminently ſucceeded in the many trials which he had made of its powers. We might have expected that he would at leaſt have exhibited in one ſyſtematic point of view, what the ancients had done in ſeveral detached branches of the ſcience, and how far they had proceeded in the ſolution of the ſeveral ſucceſſive claſſes of problems; and we might have hoped, that he would have inſtructed us in what manner we ſhould apply that method to the ſolution of problems of a more elevated kind, daily preſented

Simſon. fented to us in the queſtions of phyſico-mathematical ſcience. By this he would have acquired diſtinguiſhed honour, and ſcience would have received the moſt valuable improvement. But Dr Simſon has done little of all this; and we cannot ſay that great helps have been derived from his labours by the eminent mathematicians of this age, who are ſucceſsfully occupied in advancing our knowledge of nature, or in improving the arts of life. He has indeed contributed greatly to the entertainment of the ſpeculative mathematician, who is more delighted with the conſcious exerciſe of his own reaſoning powers, than with the final reſult of his reſearches. Yet we are not even certain that Dr Simſon has done this to the extent he wiſhed and hoped. He has not engaged the liking of mathematicians to this analyſis, by preſenting it in the moſt agreeable form. His own extreme anxiety to tread in the very footſteps of the original authors, has, in a thouſand inſtances, precluded him from uſing his own extenſive knowledge, that he might not employ principles which were not of a claſs inferior to that of the queſtion in hand. Thus, of neceſſity, did the method appear trammelled. We are deterred from employing a proceſs which appears to reſtrain us in the application of the knowledge which we have already acquired; and, diſguſted with the tedious, and perhaps indirect path, by which we muſt arrive at an object which we ſee clearly over the hedge, and which we could reach by a few ſteps, of the ſecurity of which we are otherwiſe perfectly aſſured. Theſe prepoſſeſſions are indeed founded on miſtake; but the miſtake is ſuch, that all fall into it, till experience has enlarged their views. This circumſtance alone has hitherto prevented mathematicians from acquiring that knowledge of the ancient analyſis which would enable them to proceed in their reſearches with certainty, diſpatch, and delight. It is therefore deeply to be regretted, that this eminent genius has occupied, in this ſuperſtitious palæology, a long and buſy life, which might have been employed in original works of infinite advantage to the world, and honour to himſelf.

Our readers will, it is hoped, conſider theſe obſervations as of general ſcientific importance, and as intimately connected with the hiſtory of mathematics; and therefore as not improperly introduced in the biographical account of one of the moſt eminent writers on this ſcience. Dr Simſon claimed our notice as a mathematician; and his affectionate admiration of the ancient analyſis is the prominent feature of his literary character. By this he is known all over Europe; and his name is never mentioned by any foreign author without ſome very honourable alluſion to his diſtinguiſhed geometrical elegance and ſkill. Dr James Moor, profeſſor of Greek in the univerſity of Glaſgow, no leſs eminent for his knowledge in ancient geometry than for his profeſſional talents, put the following appoſite inſcription below a portrait of Dr Simſon:

GEOMETRIAM, SUB TYRANNO BARBARO SÆVA
SERVITUTE DIU SQUALENTEM, IN LIBERTATEM
ET DECUS ANTIQUUM VINDICAVIT
UNUS.

Yet it muſt not be underſtood that Dr Simſon's predilection for the geometrical analyſis of the ancients did ſo far miſlead him as to make him neglect the ſymbolical analyſis of the preſent times; on the contrary, he was completely maſter of it, as has been already obſerved, and frequently employed it. In his academical lectures to the ſtudents of his upper claſſes, he uſed to point out its proper province (which he by no means limited by a ſcanty boundary), and in what caſes it might be applied with ſafety and advantage even to queſtions of pure geometry. He once honoured the writer of this article with the ſight of a very ſhort diſſertation on this ſubject (perhaps the one referred to in the preface to his Conic Sections). In this piece he was perhaps more liberal than the moſt zealous partiſans of the ſymbolical analyſis could deſire, admitting as a ſufficient equation of the Conic Sections $L = \frac{p^2 c}{x^2}$, where L is the *latus rectum*, x is the diſtance of any point of the curve from the focus, p is the perpendicular drawn from the focus to the tangent in the given point, and c is the chord of the equicurve circle drawn through the focus. Unfortunately this diſſertation was not found among his papers. He ſpoke in high terms of the Analytical Works of Mr Cotes, and of the two Bernoullis. He was conſulted by Mr M'Laurin during the progreſs of his ineſtimable Treatiſe of Fluxions, and contributed not a little to the reputation of that work. The ſpirit of that moſt ingenious algebraic demonſtration of the fluxions of a rectangle, and the very proceſs of the argument, is the ſame with Dr Simſon's in his diſſertation on the limits of quantities. It was therefore from a thorough acquaintance with the ſubject, and by a juſt taſte, that he was induced to prefer his favourite analyſis, or, to ſpeak more properly, to exhort mathematicians to employ it in its own ſphere, and not to become ignorant of geometry, while he ſucceſsfully employed the ſymbolical analyſis in caſes which did not require it, and which ſuffered by its admiſſion. It muſt be acknowledged, however, that in his later years, the diſguſt which he felt at the artificial and ſlovenly employment on ſubjects of pure geometry, ſometimes hindered him from even looking at the moſt refined and ingenious improvements of the algebraic analyſis which occur in the writings of Euler, D'Alembert, and other eminent maſters. But, when properly informed of them, he never failed to give them their due praiſe; and we remember him ſpeaking, in terms of great ſatisfaction, of an improvement of the infinitеſimal calculus, by D'Alembert and De la Grange, in their reſearches concerning the propagation of ſound, and the vibrations of muſical cords.

Simſon.

And that Dr Simſon not only was maſter of this calculus and the ſymbolical calculus in general, but held them in proper eſteem, appears from two valuable diſſertations to be found in his poſthumous works; the one on logarithms, and the other on the limits of ratios. The laſt, in particular, ſhows how completely he was ſatisfied with reſpect to the ſolid foundation of the method of fluxions; and it contains an elegant and ſtrict demonſtration of all the applications which have been made of the method by its illuſtrious author to the objects of pure geometry.

We hoped to have given a much more complete and inſtructive account of this eminent geometer and his works, by the aid of a perſon fully acquainted with both, and able to appreciate their value; but an accident has deprived us of this aſſiſtance, when it was too late to procure an equivalent: and we muſt requeſt our readers to accept of this very imperfect account, ſince we cannot do juſtice to Dr Simſon's merit, unleſs almoſt

equally

Simſon. equally converſant in all the geometry of the ancient Greeks.

The life of a literary man rarely teems with anecdote; and a mathematician, devoted to his ſtudies, is perhaps more abſtracted than any other perſon from the ordinary occurrences of life, and even the ordinary topics of converſation. Dr Simſon was of this claſs; and, having never married, lived entirely a college life. Having no occaſion for the commodious houſe to which his place in the univerſity entitled him, he contented himſelf with chambers, good indeed, and ſpacious enough for his ſober accommodation, and for receiving his choice collection of mathematical writers, but without any decoration or commodious furniture. His official ſervant ſufficed for valet, footman, and chambermaid. As this retirement was entirely devoted to ſtudy, he entertained no company in his chambers, but in a neighbouring houſe, where his apartment was ſacred to him and his gueſts.

Having in early life devoted himſelf to the reſtoration of the works of the ancient geometers, he ſtudied them with unremitting attention; and, retiring from the promiſcuous intercourſe of the world, he contented himſelf with a ſmall ſociety of intimate friends, with whom he could lay aſide every reſtraint of ceremony or reſerve, and indulge in all the innocent frivolities of life. Every Friday evening was ſpent in a party at whiſt, in which he excelled, and took delight in inſtructing others, till increaſing years made him leſs patient with the dulneſs of a ſcholar. The card-party was followed by an hour or two dedicated ſolely to playful converſation. In like manner, every Saturday he had a leſs ſelect party to dinner at a houſe about a mile from town. The Doctor's long life gave him occaſion to ſee the *dramatis perſonæ* of this little theatre ſeveral times completely changed, while he continued to give it a perſonal identity: ſo that, without any deſign or wiſh of his own, it became, as it were, his own houſe and his own family, and went by his name. In this ſtate did the preſent writer firſt ſee it, with Dr Simſon as its father and head, reſpected and beloved by every branch; for, as it was for relaxation, and not for the enjoyment of his acknowledged ſuperiority, that he continued this habit of his early youth; and as his notions "of a fine talk" did not conſiſt in the pleaſure of having "toſſed and gored a good many to-day," his companions were as much at their eaſe as he wiſhed to be himſelf; and it was no ſmall part of their entertainment (and of his too), to ſmile at thoſe innocent deviations from common forms, and thoſe miſtakes with reſpect to life and manners, which an almoſt total retirement from the world, and inceſſant occupation in an abſtract ſcience, cauſed this venerable preſident frequently to exhibit. Theſe are remembered with a more affecting regret, that they are now "with the days that are paſt," than the moſt pithy apophthegms, uſhered in with an emphatical, "Why, Sir!" or "No, Sir!" which precludes all reply. Dr Simſon never exerted his preſidial authority, unleſs it were to check ſome infringement of good breeding, or any thing that appeared unfriendly to religion or purity of manners; for theſe he had the higheſt reverence. We have twice heard him ſing (he had a fine voice and moſt accurate ear) ſome lines of a Latin hymn to the Divine Geometer, and each time the rapturous tear ſtood in his eye.

But we aſk the reader's pardon for this digreſſion; it is not however uſeleſs, ſince it paints the man as much as any recital of his ſtudies; and to his acquaintances we are certain that it will be an acceptable memorandum. To them it was often matter of regret, that a perſon of ſuch eminent talents, which would have made him ſhine equally in any line of life, ſhould have allowed himſelf to be ſo completely devoted to a ſtudy which abſtracted him from the ordinary purſuits of men, unfitted him for the active enjoyment of life, and kept him out of thoſe walks which they frequented, and where they would have rejoiced to meet him. Simſon || Sinai.

Dr Simſon was of an advantageous ſtature, with a fine countenance; and even in his old age had a graceful carriage and manner, and always, except when in mourning, dreſſed in white cloth. He was of a cheerful diſpoſition; and though he did not make the firſt advances to acquaintance, had the moſt affable manner, and ſtrangers were at perfect eaſe in his company. He enjoyed a long courſe of uninterrupted health; but towards the cloſe of life ſuffered from an acute diſeaſe, and was obliged to employ an aſſiſtant in his profeſſional labours for a few years preceding his death, which happened in 1768, at the age of 81. He left to the univerſity his valuable library, which is now arranged apart from the reſt of the books, and the public uſe of it is limited by particular rules. It is conſidered as the moſt choice collection of mathematical books and manuſcripts in the kingdom, and many of them are rendered doubly valuable by Dr Simſon's notes.

SIN, a breach or tranſgreſſion of ſome divine law or command.

SINAI, or SINA, a famous mountain of Arabia Petræa, upon which God gave the law to Moſes. It ſtands in a kind of peninſula, formed by the two arms of the Red ſea, one of which ſtretches out towards the north, and is called the *gulf of Kolſum*; the other extends towards the eaſt, and is called the *gulf of Elan*, or the *Elanitiſh ſea*. At this day the Arabians call Mount Sinai by the name of *Tor*, that is, the "mountain," by way of excellence; or *Gibel* or *Jibel Mouſa*, "the mountain of Moſes." It is 260 miles from Cairo, and generally it requires a journey of ten days to travel thither. The wilderneſs of Sinai, where the Iſraelites continued encamped for almoſt a year, and where Moſes erected the tabernacle of the covenant, is conſiderably elevated above the reſt of the country; and the aſcent to it is by a very craggy way, the greateſt part of which is cut out of the rock; then one comes to a large ſpace of ground, which is a plain ſurrounded on all ſides by rocks and eminences, whoſe length is nearly 12 miles. Towards the extremity of this plain, on the north ſide, two high mountains ſhow themſelves, the higheſt of which is called *Sinai* and the other *Horeb*. The tops of Horeb and Sinai have a very ſteep aſcent, and do not ſtand upon much ground, in compariſon to their extraordinary height: that of Sinai is at leaſt one-third part higher than the other, and its aſcent is more upright and difficult.

Two German miles and a half up the mountain ſtands the convent of St Catharine. The body of this monaſtery is a building 120 feet in length and almoſt as many in breadth. Before it ſtands another ſmall building, in which is the only gate of the convent, which remains always ſhut, except when the biſhop is here. *Niebuhr's Travels*, vol i. p. 192,

Sinai || Sindy.

here. At other times, whatever is introduced within the convent, whether men or proviſions, is drawn up by the roof in a baſket, and with a cord and a pulley. The whole building is of hewn ſtone; which, in ſuch a deſert, muſt have coſt prodigious expence and pains. Near this chapel iſſues a fountain of very good freſh water; it is looked upon as miraculous by ſome who cannot conceive how water can flow from the brow of ſo high and barren a mountain. Five or ſix paces from it they ſhow a ſtone, the height of which is four or five feet, and breadth about three, which, they ſay, is the very ſtone whence Moſes cauſed the water to guſh out. Its colour is of a ſpotted gray, and it is as it were ſet in a kind of earth, where no other rock appears. This ſtone has 12 holes or channels, which are about a foot wide, whence it is thought the water came forth for the Iſraelites to drink.

Much has been ſaid of the writings to be ſeen at Sinai and in the plain about it; and ſuch were the hopes of diſcoveries reſpecting the wanderings of the Iſraelites from theſe writings, that Dr Clayton biſhop of Clogher offered 500l. ſterling to defray the expences of journey to any man of letters who would undertake to copy them. No man, we believe, undertook this taſk: and the accurate Daniſh traveller Niebuhr found no writings there, but the names of perſons who had viſited the place from curioſity, and of Egyptians who had choſen to be buried in that region.

SINAPIS, MUSTARD, a genus of plants belonging to the claſs *tetradynamia*, and to the order *ſiliquoſa*; and in the natural ſyſtem ranged under the 39th order, *Siliquoſæ*. See BOTANY *Index*.

SINAPISM, in *Pharmacy*, an external medicine, in form of a cataplaſm, compoſed chiefly of muſtard-ſeed pulverized, and other ingredients mentioned in the preceding article.

SINCERITY, honeſty of intention, freedom from hypocriſy. See MORAL PHILOSOPHY, N° 157.

SINCIPUT, in *Anatomy*, the forepart of the head, reaching from the forehead to the coronal ſuture.

SINDY, a province of Hindoſtan Proper, bounded on the weſt by Makran, a province of Perſia; on the north by the territories of the king of Candahar; on the north-eaſt by thoſe of the Seiks; on the eaſt by a ſandy deſert; and on the ſouth-eaſt by Cutch. It extends along the courſe of the river Sinde or Indus from its mouth to Behker or Bhakor, on the frontiers of Moultan. Reckoned that way, it is 300 miles long; and its breadth, in its wideſt part, is about 160. In many particulars of ſoil and climate, and in the general appearance of the ſurface, Sindy reſembles Egypt; the lower part of it being compoſed of rich vegetable mould, and extended into a wide dell; while the upper part of it is a narrow ſlip of country, confined on one ſide by a ridge of mountains, and on the other by a ſandy deſert, the river Indus, equal at leaſt to the Nile, winding through the midſt of this level valley, and annually overflowing it. During great part of the ſouth-weſt monſoon, or at leaſt in the months of July, Auguſt, and part of September, which is the rainy ſeaſon in moſt other parts of India, the atmoſphere is here generally clouded; but no rain falls except very near the ſea. Indeed, very few ſhowers fall during the whole year; owing to which, and the neighbourhood of the ſandy deſerts, which bound it on the eaſt and on the north-weſt, the heats are ſo violent, and the winds from thoſe quarters ſo pernicious, that the houſes are contrived ſo as to be occaſionally ventilated by means of apertures on the tops of them, reſembling the funnels of ſmall chimneys. When the hot winds prevail, the windows are cloſely ſhut; and the loweſt part of the current of air, which is always the hotteſt, being thus excluded, a cooler, becauſe more elevated, part deſcends into the houſe through the funnels. By this contrivance alſo vaſt clouds of duſt are excluded; the entrance of which would alone be ſufficient to render the houſes uninhabitable. The roofs are compoſed of thick layers of earth inſtead of terraces. Few countries are more unwholeſome to European conſtitutions, particularly the lower part of the Delta. The prince of this province is a Mahometan, tributary to the king of Candahar. He reſides at Hydrabad, although Tatta is the capital. The Hindoos, who were the original inhabitants of Sindy, are by their Mahometan governors treated with great rigour, and denied the public exerciſe of their religion; and this ſeverity drives vaſt numbers of them into other countries. The inland parts of Sindy produce ſaltpetre, ſal-ammoniac, borax, bezoar, lapis lazuli, and raw ſilk. They have alſo manufactories of cotton and ſilk of various kinds; and they make fine cabinets, inlaid with ivory, and finely lackered. They alſo export great quantities of butter, clarified and wrapt up in duppas, made of the hides of cattle. The ladies wear hoops of ivory on both their arms and legs, which when they die are burnt with them. They have large black cattle, excellent mutton, and ſmall hardy horſes. Their wild game are deer, hares, antelopes, and foxes, which they hunt with dogs, leopards, and a ſmall fierce creature called a ſhiahguſh.

Sindy || Singing.

SINE, or *Right SINE of an Arch*, in *Trigonometry*, is a right line drawn from one end of that arch, perpendicular to the radius drawn to the other end of the arch; being always equal to half the cord of twice the arch. See TRIGONOMETRY and GEOMETRY.

SINECURE, a nominal office, which has a revenue without any employment.

SINEW, a tendon, that which unites the muſcles to the bones.

SINGING, the action of making divers inflections of the voice, agreeable to the ear, and correſpondent to the notes of a ſong or piece of melody. See MELODY.

The firſt thing to be done in learning to ſing, is to raiſe a ſcale of notes by tones and ſemitones to an octave, and deſcend by the ſame notes; and then to riſe and fall by greater intervals, as a third, fourth, fifth, &c. and to do all this by notes of different pitch. Then theſe notes are repreſented by lines and ſpaces, to which the ſyllables *fa*, *ſol*, *la*, *mi*, are applied, and the pupil taught to name each line and ſpace thereby; whence this practice is called *ſol-faing*, the nature, reaſon, effects, &c. whereof, ſee under the article SOLFAING.

SINGING of Birds. It is worthy of obſervation, that the female of no ſpecies of birds ever ſings: with birds it is the reverſe of what occurs in human kind. Among the feathered tribe, all the cares of life fall to the lot of the tender ſex; theirs is the fatigue of incubation; and the principal ſhare in nurſing the helpleſs brood: to alleviate theſe fatigues, and to ſupport her under them, nature hath given to the male the ſong, with all the little

Singing || Sinking.

little blandiſhments and ſoothing arts; theſe he fondly exerts (even after courtſhip) on ſome ſpray contiguous to the neſt, during the time his mate is performing her parental duties. But that ſhe ſhould be ſilent is alſo another wiſe proviſion of nature, for her ſong would diſcover her neſt; as would a gaudineſs of plumage, which, for the ſame reaſon, ſeems to have been denied her.

On the ſong of birds ſeveral curious experiments and obſervations have been made by the Hon. Daines Barrington. See *Phil. Tranſ.* vol. lxiii.

SINGULAR NUMBER, in *Grammar*, that number of nouns and verbs which ſtands oppoſed to plural. See GRAMMAR, N° 14.

SINISTER, ſomething on or towards the left hand. Hence ſome derive the word *ſiniſter à ſinendo;* becauſe the gods, by ſuch auguries, permit us to proceed in our deſigns.

SINISTER, is ordinarily uſed among us for unlucky; though, in the ſacred rites of divination, the Romans uſed it in an oppoſite ſenſe. Thus *avis ſiniſtra*, or a bird on the left hand, was eſteemed a happy omen: whence, in the law of the 12 tables, *Ave ſiniſtra populi magiſter eſto.*

SINISTER, in *Heraldry*. The ſiniſter ſide of an eſcutcheon is the left-hand ſide; the ſiniſter chief, the left angle of the chief; the ſiniſter baſe, the left-hand part of the baſe.

SINISTER Aſpect, among aſtrologers, is an appearance of two planets happening according to the ſucceſſion of the ſigns; as Saturn in Aries, and Mars in the ſame degree of Gemini.

SINISTRI, a ſet of ancient heretics, thus called becauſe they held the left hand in abhorrence, and made it a point of religion not to receive any thing therewith.

SINKING FUND, a proviſion made by parliament, conſiſting of the ſurpluſage of other funds, intended to be appropriated to the payment of the national debt; on the credit of which very large ſums have been borrowed for public uſes.

As the funding ſyſtem had been adopted in other countries long before it was reſorted to in Great Britain, a proviſion of this kind had appeared neceſſary at a much earlier period, and had been eſtabliſhed in Holland in 1655, and in the eccleſiaſtical ſtates in 1685. Theſe funds were both formed by the reduction of the intereſt on the public debts, and by appropriating the annual ſum thus ſaved to the gradual diſcharge of the principal.

In the reign of King William, when the mode of providing for extraordinary expences was firſt adopted in this country, the particular tax on which money was borrowed, generally produced much more than was ſufficient to pay the annual intereſt, and the ſurplus was applied in ſinking the principal, which was generally effected in a few years. Had this plan been purſued, there never could have been any great accumulation of public debts; but, as the expenditure increaſed, and the neceſſity of loans of ſtill greater amount became more frequent, it was found difficult to provide for the annual intereſt of the ſums thus borrowed; and the repayment of the principal was either put off to a diſtant period, or left without any proviſion to the chance of more flouriſhing times.

Some of the effects of an accumulating public debt ſoon became evident in the diſcount at which all government ſecurities ſold, and in the difficulties experienced in providing for the annual expenditure; the propriety of reducing, and even of wholly diſcharging, the debt, was generally acknowledged; and the plan of a ſinking fund was recommended in a pamphlet publiſhed in 1701. In 1713 Mr Archibald Hutchiſon preſented to George I. a plan for payment of the public debts. In 1715 different projects for this purpoſe were publiſhed by Edward Leigh, Mr Aſgill, and others. And in 1717 a plan for the gradual diſcharge of the debt was actually adopted, which was afterwards generally known by the name of the ſinking fund. Sinking.

For a few years the fund was ſtrictly applied to the purpoſes for which it was eſtabliſhed; and ſo well were its nature and importance then underſtood, that money was at the ſame time borrowed for extraordinary expences. In 1724, the ſum of 15,144l. 19s. was taken from the fund, to make good the loſs to the treaſury from the reduction of the value of gold coin; and within 12 years from its eſtabliſhment it was charged with the intereſt of new loans. In 1733, the groſs ſum of half a million was taken from it towards the ſupplies, at which time the medium annual produce of the fund for five years had been 1,212,000l. This amount would have fully diſcharged the debt which then exiſted, but the alienation of it was continued.

This was ſucceeded by the conſolidated fund, one object of which was, to lay the foundation of a new ſinking fund, and conſiſting, like the old one, in the application of the principle of compound intereſt. On this occaſion Mr Pitt conſulted the late Dr Price, who communicated three plans, one of which was afterwards adopted, but with ſuch alterations as greatly affected its efficacy, and which it has been ſince found neceſſary to correct. By the act paſſed for carrying this ſcheme into execution, the annual ſum of 1,000,000l. was placed in the hands of commiſſioners, to be iſſued in four equal quarterly payments, and to be applied either in paying off ſuch redeemable annuities as were at or above par, or in the purchaſe of annuities below par, at the market-price.

On the 17th of February, 1792, Mr Pitt propoſed that the ſum of 400,000l. ſhould be iſſued in addition to the million, for the purpoſe of accelerating the operation of the fund: and ſtated that it might be expected that 25 millions of 3 per cents would be paid off by the year 1800; and that in the year 1808, the fund would amount to 4,000,000l. per annum, the ſum to which it was then reſtricted. The injudicious reſtriction of the fund to 4,000,000l. per annum, was done away by an act paſſed in 1802, which directed that the produce of the two funds ſhould continue to accumulate, without any limitation as to its amount, and be from time to time applied, according to the former proviſions, in the redemption or purchaſe of ſtock, until the whole of the perpetual redeemable annuities, exiſting at the time of paſſing the act, ſhall have been completely paid off. At the ſame time, the annual grant of 200,000l. in aid of the fund, was made a permanent charge, to be iſſued in quarterly payments from the conſolidated fund, in the ſame manner as the original million per annum. In conſequence of theſe improvements, the increaſe of the fund has been much greater than it was originally

Sinking Sinus.

originally eſtimated; and on the 1ſt of February, 1806, was as follows:

Annual charge by act of 26 Geo. III. - -	L. 1,000,000	0	0
Ditto 42 Geo. III. -	200,000	0	0
Annuities for 99 and 96 years, expired 1792 -	54,880	14	6
Short annuities, expired 1787	25,000	0	0
Life annuities, unclaimed and expired - -	50,308	5	7
Dividend on 98,386,402l. at 3 per cent. - -	2,951,592	1	2
Ditto on 2,617,400l. at 4 per cent.	104,696	0	0
Ditto on 142,000l. at 5 per cent.	7,100	0	0
One per cent. on capitals erected ſince 1723 -	3,202,672	1	10
Total,	L. 7,596,249	3	1

This ſum is excluſive of the fund for the reduction of the public debt of Ireland, which at the above period amounted to 479,537l. 8s. and of the fund for reduction of the imperial debt, which amounted to 56,960l. 9s. 4d.

The progreſs of the fund from the commencement of its operation on 1ſt Auguſt 1786, to the 1ſt February 1806, will appear from the following ſtatement of the total amount of the ſtock redeemed by the commiſſioners up to the latter period.

Conſolidated 3 per cent. annuities	L. 39,922,421
Reduced 3 per cent. annuities	51,493,981
Old South ſea annuities	3,492,000
New South ſea annuities	2,783,000
Three per cents 1751 -	695,000
Conſolidated 4 per cent. annuities	2,617,400
Navy 5 per cent. annuities	142,000
Total,	L. 101,145,802

The total ſum which had been paid for this amount of ſtock was, 62,842,782l. 7s. 10d. the conſolidated 3 per cents having been bought up on an average at 61l. per cent. and the reduced at ſomewhat leſs.

The progreſs already made by the fund, and the important effect it has had in ſupporting the value of the government ſecurities at a time when it has been neceſſary to borrow unprecedented ſums in almoſt every year, ſufficiently demonſtrate the great utility of this meaſure. As its increaſe will be continually augmenting, it will, if ſteadily perſevered in, and faithfully applied, become ultimately capable of diſcharging a debt of any amount with which it is poſſible to ſuppoſe the country will ever be encumbered.

SINOPLE, in *Heraldry*, denotes vert, or green colour in armories.—Sinople is uſed to ſignify love, youth, beauty, rejoicing, and liberty; whence it is that letters of grace, ambition, legitimation, &c. are always ſealed with green wax.

SINUOSITY, a ſeries of bends and turns in arches or other irregular figures, ſometimes jutting out and ſometimes falling in.

SINUS, in *Anatomy*, denotes a cavity in certain bones and other parts, the entrance whereof is very narrow, and the bottom wider and more ſpacious.

Siphon Sirens.

SINUS, in *Surgery*, a little cavity or ſacculus, frequently formed by a wound or ulcer, wherein pus is collected.

SIPHON. See HYDRODYNAMICS.

SIPHONANTHUS, a genus of plants belonging to the claſs of tetrandria and order of monogynia. See BOTANY *Index*.

SIPONTUM, SEPUNTUM, or *SIPUS*, in *Ancient Geography*, a town of Apulia, ſo denominated (according to Strabo) from the great quantity of *ſepiæ* or cuttleſiſh that are thrown upon the coaſt. Diomede is ſuppoſed by the ſame author to have been the founder of this place; which appears from Livy to have become a colony of Roman citizens. In the early ages of Chriſtian hierarchy, a biſhop was fixed in this church; but, under the Lombards, his ſee was united to that of Beneventum. Being again ſeparated, Sipontum became an archiepiſcopal dioceſe in 1094, about which time it was ſo ill treated by the Barbarians, that it never recovered its ſplendour, but ſunk into ſuch miſery, that in 1260 it was a mere deſert, from the want of inhabitants, the decay of commerce, and the inſalubrity of the air. Manfred having taken theſe circumſtances into conſideration, began in 1261 to build a new city on the ſea-ſhore, to which he removed the few remaining Sipontines. (See the article MANFREDONIA). Sipontum was ſituated at the diſtance of a mile from the ſhore. Excepting a part of its Gothic cathedral, ſcarce one ſtone of the ancient city now remains upon another.

SIPUNCULUS, in *Natural Hiſtory*, a genus of the claſs of vermes, and order inteſtina. See HELMINTHOLOGY *Index*.

SIR, the title of a knight or baronet, which, for diſtinction's ſake, as it is now given indiſcriminately to all men, is always prefixed to the knight's Chriſtian name, either in ſpeaking or writing to them.

SIRCAR, any office under the government in Hindoſtan. It is ſometimes uſed for the ſtate of government itſelf. Likewiſe a province, or any number of pergunnahs placed under one head in the government books, for conveniency in keeping accounts. In common uſage in Bengal, the under banyans of European gentleman are called *ſircars*.

SIRE, a title of honour formerly given to the king of France as a mark of ſovereignty.

SIRE, was likewiſe anciently uſed in the ſame ſenſe with *ſieur* and *ſeigneur*, and applied to barons, gentlemen, and citizens.

SIRENS, in fabulous hiſtory, certain celebrated ſong-ſtreſſes who were ranked among the demigods of antiquity. Hyginus places their birth among the conſequences of the rape of Proſerpine. Others make them daughters of the river Acheloüs and one of the muſes*. The number of the Sirens was three, and their names were *Parthenope*, *Lygea*, and *Leucoſia*. Some make them half women and half fiſh; others, half women and half birds. There are antique repreſentations of them ſtill ſubſiſting under both theſe forms. Pauſanias tells us, that the Sirens, by the perſuaſion of Juno, challenged the Muſes to a trial of ſkill in ſinging; and theſe having vanquiſhed them, plucked the golden feathers from the wings of the Sirens, and formed them into

*Ovid Met. lib. iv.

Sirens. crowns, with which they adorned their own heads. The Argonauts are ſaid to have been diverted from the enchantment of their ſongs by the ſuperior ſtrains of Orpheus: Ulyſſes, however, had great difficulty in ſecuring himſelf from ſeduction. See *Odyſ.* lib. xii.

Pope, in his notes to the twelfth book of the Odyſſey, obſerves, the critics have greatly laboured to explain what was the foundation of this fiction of the Sirens. We are told by ſome, that the Sirens were queens of certain ſmall iſlands named *Sirenuſæ*, that lie near Capræa in Italy, and chiefly inhabited the promontory of Minerva, upon the top of which that goddeſs had a temple, as ſome affirm, built by Ulyſſes. Here there was a renowned academy, in the reign of the Sirens, famous for eloquence and the liberal ſciences, which gave occaſion to the invention of this fable of the ſweetneſs of the voice and attracting ſongs of the Sirens. But why then are they fabled to be deſtroyers, and painted in ſuch dreadful colours? We are told, that at laſt the ſtudents abuſed their knowledge, to the colouring of wrong, the corruption of manners, and the ſubverſion of government: that is, in the language of poetry, they were feigned to be transformed into monſters, and with their muſic to have enticed paſſengers to their ruin, who there conſumed their patrimonies, and poiſoned their virtues with riot and effeminacy. The place is now called *Maſſa*. Some writers tell us of a certain bay, contracted within winding ſtraits and broken cliffs, which, by the ſinging of the winds and beating of the waters, returns a delightful harmony, that allures the paſſenger to approach, who is immediately thrown againſt the rocks, and ſwallowed up the violent eddies. Thus Horace, moraliſing, calls idleneſs a *Siren*.

——Vitanda eſt improba Siren
Deſidia.——

But the fable may be applied to all pleaſures in general, which, if too eagerly purſued, betray the incautious into ruin; while wiſe men, like Ulyſſes, making uſe of their reaſon, ſtop their ears againſt their inſinuations.

The learned Mr Bryant ſays, that the Sirens were Cuthite and Canaanitiſh prieſts, who had founded temples in Sicily, which were rendered infamous on account of the women who officiated. They were much addicted to cruel rites, ſo that the ſhores upon which they reſided are deſcribed as covered with the bones of men deſtroyed by their artifice. *Virgil. Æneid.* lib. v. ver. 864.

All ancient authors agree in telling us, that Sirens inhabited the coaſt of Sicily. The name, according to Bochart, who derives it from the Phœnician language, implies a ſongſtreſs. Hence it is probable, ſays Dr Burney, that in ancient times there may have been excellent ſingers, but of corrupt morals, on the coaſt of Sicily, who, by ſeducing voyagers, gave riſe to this fable. And if this conjecture be well founded, he obſerves, the Muſes are not the only pagan divinities who preſerved their influence over mankind in modern times; for every age has its Sirens, and every Siren her votaries; when beauty and talents, doth powerful in themſelves, are united, they become ſtill more attractive.

SIREN, in *Zoology*, a genus of animals belonging to the claſs of *amphibia* and the order of *meantes*. It is a biped, naked, and furniſhed with a tail; the feet are brachiated with claws. This animal was diſcovered by Dr Garden in Carolina; it is found in ſwampy and muddy places, by the ſides of pools, under the trunks of old trees that hang over the water. The natives call it by the name of *mud-inguana*. Linnæus firſt apprehended, that it was the larva of a kind of lizard; but as its fingers are furniſhed with claws, and it makes a croaking noiſe, he concluded from theſe properties, as well as from the ſituation of the anus, that it could not be the larva of the lizard, and therefore formed of it a new genus under the name of *ſiren*. He was alſo obliged to eſtabliſh for this uncommon animal a new order called *meantes* or *gliders*; the animals of which are amphibious, breathing by means of gills and lungs, and furniſhed with arms and claws. Sirens ‖ Siſyphus. *Phil. Tranſ.* vol. lvi. p. 189.

SIREX, a genus of inſects belonging to the order of *hymenopteræ*. See ENTOMOLOGY *Index*.

SIRIUM, a genus of plants belonging to the claſs of tetrandria and order of monogynia. See BOTANY *Index*.

SIRIUS, in *Aſtronomy*, a bright ſtar in the conſtellation Canis. See ASTRONOMY, N° 403, &c.

SIRLET, FLAVIUS, an eminent Roman engraver on precious ſtones: his Laocoon, and repreſentations in miniature of antique ſtatues at Rome, are very valuable and ſcarce. He died in 1737.

SIROCCO, a periodical wind which generally blows in Italy and Dalmatia every year about Eaſter. It blows from the ſouth-eaſt by ſouth: it is attended with heat, but not rain; its ordinary period is twenty days, and it uſually ceaſes at ſunſet. When the ſirocco does not blow in this manner, the ſummer is almoſt free from weſterly winds, whirlwinds, and ſtorms. This wind is prejudicial to plants, drying and burning up the buds; though it hurts not men any otherwiſe than by cauſing an extraordinary weakneſs and laſſitude; inconveniences that are fully compenſated by a plentiful fiſhing, and a good crop of corn on the mountains. In the ſummer time, when the weſterly wind ceaſes for a day, it is a ſign that the ſirocco will blow the day following, which uſually begins with a ſort of whirlwind. *Fortis's Travels into Dalmatia*, p. 277.

SISKIN. See FRINGILLA, ORNITHOLOGY *Index*.

SISON, BASTARD STONE PARSLEY, a genus of plants belonging to the claſs of pentandria, and to the order of digynia; and in the natural ſyſtem arranged under the 45th order, *umbellatæ*. See BOTANY *Index*.

SISTRUM, or CISTRUM, a kind of ancient muſical inſtrument uſed by the prieſts of Iſis and Oſiris. It is deſcribed by Spon as of an oval form, in manner of a racket, with three ſticks traverſing it breadthwiſe; which playing freely by the agitation of the whole inſtrument, yielded a kind of ſound which to them ſeemed melodious. Mr Malcom takes the ſiſtrum to be no better than a kind of rattle. Oiſelius obſerves, that the ſiſtrum is found repreſented on ſeveral medals, and on taliſmans.

SISYMBRIUM, WATER-CRESES, a genus of plants belonging to the claſs of *tetradynamia*, and to the order of *ſiliquoſa*; and in the natural ſyſtem ranged under the 39th order, *Siliquoſæ*. See BOTANY *Index*.

SISYPHUS, in fabulous hiſtory, one of the deſcendents of Eolus, married Merope, one of the Pleiades, who bore him Glaucus. He reſided at Epyra in Peloponneſus, and was a very crafty man. Others ſay, that he was a Trojan ſecretary, who was puniſhed for diſcovering

Sisyrinchium || Sium

vering secrets of state; and others again, that he was a notorious robber, killed by Theseus. However, all the poets agree that he was punished in Tartarus for his crimes, by rolling a great stone to the top of a hill, which constantly recoiled, and, rolling down incessantly, renewed his labour.

SISYRINCHIUM, a genus of plants belonging to the class of *gynandria*, and order of *triandria*; and in the natural system ranged under the 5th order, *Ensatæ*. See BOTANY *Index*.

SITE, denotes the situation of an house, &c. and sometimes the ground-plot or spot of earth on which it stands.

SITTA, NUTHATCH, a genus of birds belonging to the order of *piceæ*. See ORNITHOLOGY *Index*.

SITOPHYLAX, Σιτοφυλαξ, formed from σιτος "corn," and φυλαξ, "keeper," in antiquity, an Athenian magistrate, who had the superintendence of the corn, and was to take care that nobody bought more than was necessary for the provision of his family. By the Attic laws, particular persons were prohibited from buying more than fifty measures of wheat a man; and that such persons might not purchase more, the sitophylax was appointed to see the laws properly executed. It was a capital crime to prevaricate in it. There were 15 of these *sitophylaces*, ten for the city, and five for the Piræus.

SITUS, in *Algebra* and *Geometry*, denotes the situation of lines, surfaces, &c. Worsius delivers some things in geometry, which are not deduced from common analysis, particularly matters depending on the *situs* of lines and figures. Leibnitz has even founded a particular kind of analysis upon it, called *calculus situs*.

SIVA, a name given by the Hindoos to the Supreme Being, when considered as the avenger or destroyer. Sir William Jones has shown that in several respects the character of Jupiter and Siva are the same. As Jupiter overthrew the Titans and giants, so did Siva overthrow the Daityas, or children of Diti, who frequently rebelled against Heaven; and as during the contest the god of Olympus was furnished with lightning and thunderbolts by an eagle, so Brahma, who is sometimes represented riding on the Garuda, or eagle, presented the god of destruction with fiery shafts. Siva also corresponds with the Stygian Jove, or Pluto; for, if we can rely on a Persian translation of the Bhágavat, the sovereign of Pátála, or the infernal regions, is the king of serpents, named *Seshanaga*, who is exhibited in painting and sculpture, with a diadem and sceptre, in the same manner as Pluto. There is yet another attribute of Siva, or Mahádéva, by which he is visibly distinguished in the drawings and temples of Bengal. To destroy, according to the Vedantis of India, the Sufis of Persia, and many philosophers of our European schools, is only to generate and reproduce in another form. Hence the god of destruction is holden in this country to preside over generation, as a symbol of which he rides on a white bull. Can we doubt that the loves and feats of Jupiter Genitor (not forgetting the white bull of Europa), and his extraordinary title of Lapis, for which no satisfactory reason is commonly given, have a connection with the Indian philosophy and mythology?

Asiatic Researches.

SIUM, WATER PARSNEP, a genus of plants belonging to the class of *pentandria*, and order of *digynia*, and in the natural system ranging under the 44th order, *Umbellatæ*. See BOTANY *Index*.

Siwa.

SIWA, or SIWAH, a town in Egypt to the westward of Alexandria, built on a small fertile spot, surrounded on all sides by desert land. A considerable portion of this space is filled with date trees, but there are also plantains, pomegranates, figs, apricots, and olives; and the gardens are in a very flourishing condition. The people cultivate rice, which is of a reddish colour, and different from that of the delta. The rest of the land furnishes abundance of wheat for the consumption of the inhabitants.

The greatest curiosity about Siwa is a ruin of undoubted antiquity, measuring 32 feet in length, 18 in height, and 15 in breadth, which does not appear ever to have been much larger. Mr Horneman estimates the dimensions of it at 36 feet long, 24 feet wide, and 27 high, which agrees with no other traveller whatever; and indeed Mr Horneman himself allows that the jealousy of the natives prevented him from pursuing any plan of accurate examination or admeasurement. The people of Siwa have no tradition respecting this edifice, nor attribute any quality to it, but that of concealing treasures, and as the haunt of demons. It has, however, been supposed, that Siwa is the *Siropum* of Pliny, and that this building was coeval with the temple of Jupiter Ammon, and a dependency on it; yet neither the natives of Siwa, nor the various tribes of Arabs who frequent that place, know any thing of the ruins of that temple, about which Mr Browne made every possible enquiry.

The complexion of the people of Siwa is generally darker than that of the Egyptians, and their dialect is also different. They do not habitually make use of snuff or tobacco. Their sect is that of Malik. The dress of the lower class is very simple, as they are almost naked; among those whose costume was discernible, it approaches nearer to that of the Arabs of the desert than the Egyptians or Moors. Their clothing consists of a shirt of white cotton, with large sleeves reaching to the feet, a red cap without a turban, and shoes of the same colour. Some earthen ware made by themselves, and a few mats, form the chief part of their household furniture, none but the higher ranks being possessed of copper utensils. They sometimes purchase a few slaves from the Mourzouk caravan. The rest of their wants are supplied from Cairo or Alexandria, whither their dates are transported, both in a dry state, and beaten into mash, which, when good, greatly resembles a sweet meat. They do not eat large quantities of animal food, and bread known to us is uncommon. They drink plentifully of the liquor extracted from the date tree, which they call *date-tree water*, though it has frequently the power of inebriating in the state in which they drink it. Their animals are the hairy sheep and goat of Egypt, the ass, and a very small number of oxen and camels. The women wear veils as in Egypt. After the rains, the ground in the vicinity of Siwa is covered with salt for many weeks.

Siwa has sometimes been compared to a bee hive, which it very much resembles, whether in respect to the general appearance of the eminence covered with buildings, the swarm of its people crowded together, or the confused noise, or hum and buz from its narrow passages and streets, and which reach the ear at a considerable distance. North-west of the town there is a stratum of salt extending a full mile, and near it salt is found on

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the ſurface. There are numerous ſprings, and frequently a ſpring of water perfectly ſweet is found within a few paces of one that is ſalt. The people, according to Horneman, are obtruſive and thieviſh. Siwa is ſituated in 29° 12′ N. Lat. and 44° 54′ E. Long.

SIX-CLERKS, officers in chancery of great account, next in degree below the twelve maſters, whoſe buſineſs it is to enrol commiſſions, pardons, patents, warrants, &c. which paſs the great ſeal, and to tranſact and file all proceedings by bill, anſwer, &c. They were anciently *clerici*, and forfeited their places, if they married; but when the conſtitution of the court began to alter, a law was made to permit them to marry, Stat. 14. and 15. Hen. VIII. cap. 8. They are alſo ſolicitors for parties in ſuits depending in the court of chancery. Under them are ſix deputies and 60 clerks, who, with the under clerks, do the buſineſs of the office.

SIX NATIONS. See NIAGARA.

SIXTH, in *Muſic*, one of the ſimple original concords, or harmonical intervals. See INTERVAL.

SIXTUS V. POPE, was born the 13th December, 1521, in La Marca, a village in the ſeigniory of Montalto. His father, Francis Peretti, was a gardener, and his mother a ſervant maid. He was their eldeſt child, and was called Felix. At the age of nine he was hired out to an inhabitant of the village to keep ſheep; but diſobliging his maſter, he was ſoon after degraded to be keeper of the hogs. He was engaged in this employment when Father Michael Angelo Selleri, a Franciſcan friar, aſked the road to Aſcoli, where he was going to preach. Young Felix conducted him thither, and ſtruck the father ſo much with his converſation and eagerneſs for knowledge, that he recommended him to the fraternity to which he had come. Accordingly he was received among them, inveſted with the habit of a lay brother, and placed under the ſacriſtan, to aſſiſt in ſweeping the church, lighting the candles, and other offices of that nature; for which he was to be taught the reſponſes, and the rudiments of grammar. His progreſs in learning was ſo ſurpriſing, that at the age of 14 he was thought qualified to begin his noviciate, and was admitted the year following to make his profeſſion.

He purſued his ſtudies with ſuch unwearied aſſiduity, that he was ſoon reckoned equal to the beſt diſputants. He was ordained prieſt in 1545, when he aſſumed the name of Father Montalto; ſoon after he took his doctor's degree, and was appointed profeſſor of theology at Sienna. It was then that he ſo effectually recommended himſelf to Cardinal di Carpi, and his ſecretary Boſſius, that they ever remained his ſteady friends. Meanwhile the ſeverity and obſtinacy of his temper inceſſantly engaged him in diſputes with his monaſtic brethren. His reputation for eloquence, which was now ſpread over Italy, about this time gained him ſome new friends. Among theſe were the Colonna family, and Father Ghiſilieri, by whoſe recommendation he was appointed inquiſitor-general at Venice: but he exerciſed that office with ſo much ſeverity, that he was obliged to flee precipitately from that city. Upon this he went to Rome, where he was made procurator-general of his order, and ſoon after accompanied Cardinal Buon Compagnon into Spain, as a chaplain and conſultor to the inquiſition. There he was treated with great reſpect, and liberal offers were made him to induce him to continue in Spain, which, however, he could not be prevailed on to accept. Sixtus.

In the mean time, news were brought to Madrid that Pius IV. was dead. and that Father Ghiſilieri, who had been made Cardinal Alexandrino by Paul IV. had ſucceeded him under the name of Pius V. Theſe tidings filled Montalto with joy, and not without reaſon, for he was immediately inveſted by the pontiff with new dignities. He was made general of his order, biſhop of St Agatha, was ſoon after raiſed to the dignity of cardinal, and received a penſion. About this time he was employed by the pope to draw up the bill of excommunication againſt Queen Elizabeth.

He began now to caſt his eyes upon the papacy; and, in order to obtain it, formed and executed a plan of hypocriſy with unparalleled conſtancy and ſucceſs. He became humble, patient, and affable. He changed his dreſs, his air, his words, and his actions, ſo completely, that his moſt intimate friends declared him a new man. Never was there ſuch an abſolute victory gained over the paſſions; never was a fictitious character ſo long maintained, nor the foibles of human nature ſo artfully concealed. He courted the ambaſſadors of every foreign power, but attached himſelf to the intereſts of none; nor did he accept a ſingle favour that would have laid him under any peculiar obligation. He had formerly treated his relations with the greateſt tenderneſs, but he now changed his behaviour altogether. When his brother Anthony came to viſit him, he lodged him in an inn, and ſent him home next day, charging him to inform his family that he was now dead to his relations and the world.

When Pius V. died in 1572, he entered the conclave with the other cardinals, but ſeemed altogether indifferent about the election, and never left his apartment except to his devotion. When ſolicited to join any party, he declined it, declaring that he was of no conſequence, and that he would leave the choice of a pope entirely to perſons of greater knowledge and experience. When Cardinal Buon Compagnon, who aſſumed the name of Gregory XIII. was elected, Montalto aſſured him that he never wiſhed for any thing ſo much in his life, and that he would always remember his goodneſs, and the favours he had conferred on him in Spain. But the new pope treated him with the greateſt contempt, and deprived him of his penſion. The cardinals alſo, deceived by his artifices, paid him no greater reſpect, and uſed to call him, by way of ridicule, the Roman beaſt; the aſs of La Marca.

He now aſſumed all the infirmities of old age; his head hung down upon his ſhoulders; he tottered as he walked, and ſupported himſelf on a ſtaff. His voice became feeble, and was often interrupted by a cough ſo exceedingly ſevere, that it ſeemed every moment to threaten his diſſolution. He interfered in no public tranſactions, but ſpent his whole time in acts of devotion and benevolence. Mean time he conſtantly employed the ableſt ſpies, who brought him intelligence of every particular.

When Gregory XIII. died in 1585, he entered the conclave with the greateſt reluctance, and immediately ſhut himſelf up in his chamber, and was no more thought of than if he had not exiſted. When he went

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Sixtus. to mafs, for which purpofe alone he left his apartment, he appeared perfectly indifferent about the event of the election. He joined no party, yet flattered all.

He knew early that there would be great divifions in the conclave, and he was aware that when the leaders of the different parties were difappointed in their own views, they all frequently agreed in the election of fome old and infirm cardinal, the length of whofe life would merely enable them to prepare themfelves fufficiently for the next vacancy. Thefe views directed his conduct, nor was he miftaken in his hopes of fuccefs.

Three cardinals, the leaders of oppofite factions, being unable to procure the election which each of them wifhed, unanimoufly agreed to make choice of Montalto. When they came to acquaint him with their intention, he fell into fuch a violent fit of coughing that every perfon thought he would expire on the fpot. He told them that his reign would laft but a few days; that, befides a continual difficulty of breathing, he wanted ftrength to fupport fuch a weight, and that his fmall experience rendered him very unfit for fo important a charge. He conjured them all three not to abandon him, but to take the whole weight of affairs upon their own fhoulders; and declared that he would never accept the mitre upon any other terms: "If you are refolved," added he, "to make me pope, it will only be placing yourfelves on the throne. For my part, I fhall be fatisfied with the bare title. Let the world call me pope, and I make you heartily welcome to the power and authority. The cardinals fwallowed the bait, and exerted themfelves fo effectually that Montalto was elected. He now pulled off the mafk which he had worn for 14 years. No fooner was his election fecured, than he ftarted from his feat, flung down his ftaff in the middle of the hall, and appeared almoft a foot taller than he had done for feveral years.

When he was afked, according to cuftom, if he would accept of the papacy, he replied, "It is trifling to afk whether I will accept what I have already accepted.—However, to fatisfy any fcruple that may arife, I tell you that I accept it with great pleafure, and would accept another if I could get it; for I find myfelf able, by the Divine affiftance, to manage two papacies." His former complaifance and humility difappeared, together with his infirmities, and he now treated all around him with referve and haughtinefs. The firft care of Sixtus V. the name which Montalto affumed, was to correct the abufes, and put a ftop to the enormities, which were daily committed in every part of the eccleſiaſtical ſtate. The lenity of Gregory's government had introduced a general licentioufnefs of manners, which burft forth with great violence, after that pontiff's death. It had been ufual with former popes to releafe delinquents on the day of their coronation, who were therefore accuftomed to furrender themfelves voluntary prifoners immediately after the election of the pope. At prefent, however, they were fatally difappointed.—When the governor of Rome and the keeper of St Angelo waited on his Holinefs, to know his intention in this particular, he replied, "What have you to do with pardons, and releafing of prifoners? Is it not fufficient that our predeceffor has fuffered the judges to remain unemployed thefe 13 years? Shall we alfo ſtain our pontificate with the fame neglect of juſtice? We have too long feen, with inexpreffible concern, the prodigious degree of wickednefs that reigns in the ſtate, to Sixtus. think of granting pardons. Let the prifoners be brought to a fpeedy trial, and punifhed as they deferve, to fhow the world that Divine Providence has called us to the chair of St Peter, to reward the good, and chaftife the wicked: that we bear not the fword in vain, but are the miniſters of God, and a revenger to execute wrath on them that do evil."

He appointed commiffioners to inſpect the conduct of the judges, difplaced thofe who were inclined to lenity, and put others of fevere difpofitions in their room. He offered rewards to any perfon who could convict them of corruption or partiality. He ordered the fyndics of all the towns and figniories to make out a complete lift of the diſorderly perſons within their diſtricts, and threatened the ſtrapado for the ſmalleſt omiſſion. In conſequence of this edict, the ſyndic of Albino was ſcourged in the market-place, becauſe he had left his nephew, an incorrigible libertine, out of his liſt.

He made very ſevere laws againſt robbers and aſſaſſins. Adulterers, when diſcovered, ſuffered death; and they who willingly ſubmitted to the proſtitution of their wives, a cuſtom then common in Rome, received the ſame puniſhment. He was particularly careful of the purity of the female ſex, and never forgave thoſe who attempted to debauch them.

His execution of juſtice was as prompt as his edicts were rigorous. A Swiſs happening to give a Spaniſh gentleman a blow with his halberd, was ſtruck by him ſo rudely with a pilgrim's ſtaff that he expired on the ſpot. Sixtus informed the governor of Rome that he was to dine early, and that juſtice muſt be executed on the criminal before he ſat down to table. The Spaniſh ambaſſador and four cardinals intreated him not to diſgrace the gentleman by ſuffering him to die on a gibbet, but to order him to be beheaded. "He ſhall be hanged (replied Sixtus), but I will alleviate his diſgrace by doing him the honour to aſſiſt perſonally at his death." He ordered a gibbet to be erected before his own windows, where he continued ſitting during the whole execution. He then called to his ſervants to bring in dinner, declaring that the act of juſtice which he had juſt ſeen had increaſed his appetite. When he roſe from table, he exclaimed, "God be praiſed for the good appetite with which I have dined!"

When Sixtus aſcended the throne, the whole eccleſiaſtical ſtate was infeſted with bands of robbers, who from their numbers and outrages, were exceedingly formidable; by his prudent and vigorous conduct, however, he in a ſhort time extirpated the whole of theſe banditti.

Nor was the vigour of his conduct leſs conſpicuous in his tranſactions with foreign nations. Before he had been pope two months he quarrelled with Philip II. of Spain, Henry III. of France, and Henry king of Navarre. His intrigues indeed in ſome meaſure influenced all the councils of Europe.

After his acceſſion to the pontificate he ſent for his family to Rome, with expreſs orders that they ſhould appear in a decent and modeſt manner. Accordingly, his ſiſter Camilla came thither, accompanied by her daughter and two grandchildren. Some cardinals, in order to pay court to the pope, went out to meet her, and introduced her in a very magnificent dreſs. Sixtus pretended not to know her, and aſked two or three

times,

Sixtus. times who ſhe was: Upon this one of the cardinals ſaid, "It is your ſiſter, holy father." "I have but one ſiſter (replied Sixtus with a frown), and ſhe is a poor woman at Le Grotte; if you have introduced her in this diſguiſe, I declare I do not know her; yet I think I would know her again, if I ſaw her in the clothes ſhe uſed to wear."

Her conductors at laſt found it neceſſary to carry her to an inn, and ſtrip her of her finery. When Camilla was introduced a ſecond time, Sixtus embraced her tenderly, and ſaid, "Now we know indeed that it is our ſiſter: nobody ſhall make a princeſs of you but ourſelves." He ſtipulated with his ſiſter, that ſhe ſhould neither aſk any favour in matters of government, nor intercede for criminals, nor interfere in the adminiſtration of juſtice; declaring that every requeſt of that kind would meet with a certain refuſal. Theſe terms being agreed to, and punctually obſerved, he made the moſt ample proviſion not only for Camilla but for his whole relations.

This great man was alſo an encourager of learning. He cauſed an Italian tranſlation of the Bible to be publiſhed, which raiſed a good deal of diſcontent among the Catholics. When ſome cardinals reproached him for his conduct in this reſpect, he replied, "It was publiſhed for the benefit of you cardinals who cannot read Latin."

Sixtus died in 1590, after having reigned little more than five years. His death was aſcribed to poiſon, ſaid to have been adminiſtered by the Spaniards; but the ſtory ſeems rather improbable.

It was to the indulgence of a diſpoſition naturally formed for ſeverity, that all the defects of this wonderful man are to be aſcribed. Clemency was a ſtranger to his boſom; his puniſhments were often too cruel, and ſeemed ſometimes to border on revenge. Paſquin was dreſſed one morning in a very naſty ſhirt, and being aſked by Marforio why he wore ſuch dirty linen? replied, that he could get no other, for the pope had made his waſherwoman a princeſs, alluding to Camilla, who had formerly been a laundreſs. The pope ordered ſtrict ſearch to be made for the author of this lampoon, and offered him his life and a thouſand piſtoles if he would diſcover himſelf. The author was ſimple enough to make his appearance and claim the reward. "It is true (ſaid the pope) we made ſuch a promiſe, and we ſhall keep it; your life ſhall be ſpared, and you ſhall receive the money preſently: but we have reſerved to ourſelves the power of cutting off your hands and boring your tongue through, to prevent your being ſo witty for the future." It is needleſs to add, that the ſentence was immediately executed. This, however, is the only inſtance of his reſenting the many ſevere ſatires that were publiſhed againſt him.

But though the conduct of Sixtus ſeldom excites love, it generally commands our eſteem, and ſometimes our admiration. He ſtrenuouſly defended the cauſe of the poor, the widow, and the orphan: he never refuſed audience to the injured, however wretched or forlorn their appearance was. He never forgave thoſe magiſtrates who were capable of partiality or corruption; nor ſuffered crimes to paſs unpuniſhed, whether committed by the rich or the poor. He was frugal, temperate, ſober, and never neglected to reward the ſmalleſt favour which had been conferred on him before his exaltation. Sixtus, Sizar.

When he mounted the throne, the treaſury was not only exhauſted, but in debt: at his death it contained five millions of gold.

Rome was indebted to him for ſeveral of her greateſt embelliſhments, particularly the Vatican library: it was by him, too, that trade was firſt introduced into the Eccleſiaſtical State.

SIYA-GHUSH, the caracal of Buffon, an animal of the cat kind. See FELIS, MAMMALIA *Index*.

SIZAR, or SIZER, in Latin *Sizator*, an appellation by which the loweſt order of ſtudents in the univerſities of Cambridge and Dublin are diſtinguiſhed, is derived from the word *ſize*, which in Cambridge, and probably in Dublin likewiſe, has a peculiar meaning. To *ſize*, in the language of the univerſity, is to get any ſort of victuals from the kitchens, which the ſtudents may want in their own rooms, or in addition to their commons in the hall, and for which they pay the cooks or butchers at the end of each quarter. A ſize of any thing is the ſmalleſt quantity of that thing which can be thus bought: two ſizes, or a part of beef, being nearly equal to what a young perſon will eat of that diſh to his dinner; and a ſize of ale or beer being equal to half an Engliſh pint.

The ſizars are divided into two claſſes, viz. ſubſizatores or ſizars, and ſizatores or proper ſizars. The former of theſe are ſupplied with commons from the table of the fellows and fellow commoners; and in former times, when theſe were more ſcanty than they are now, they were obliged to ſupply the deficiency by ſizing, as is ſometimes the caſe ſtill. The proper ſizars had formerly no commons at all, and were therefore obliged to ſize the whole. In St John's college they have now ſome commons allowed them for dinner, from a benefaction, but they are ſtill obliged to ſize their ſuppers: in the other colleges they are allowed a part of the fellow-commons, but muſt ſize the reſt; and from being thus obliged to ſize the whole or part of their victuals, the whole order derived the name of *ſizars*.

In Oxford, the order ſimilar to that of ſizar is denominated *ſervitor*, a name evidently derived from the menial duties which they perform. In both univerſities theſe orders were formerly diſtinguiſhed by round caps and gowns of different materials from thoſe of the penſioners or commoners, the order immediately above them. But about 30 years ago the round cap was entirely aboliſhed in both ſeminaries. There is ſtill, however, in Oxford, we believe, a diſtinction in the gowns, and there is alſo a trifling difference in ſome of the ſmall colleges in Cambridge; but in the largeſt colleges the dreſs of the penſioners and ſizars is entirely the ſame.

In Oxford, the ſervitors are ſtill obliged to wait at table on the fellows and gentlemen-commoners; but much to the credit of the univerſity of Cambridge, this moſt degrading and diſgraceful cuſtom was entirely aboliſhed about 10 or 12 years ago, and of courſe the ſizars of Cambridge are now on a much more reſpectable footing than the ſervitors of Oxford.

The ſizars are not upon the foundation, and therefore while they continue ſizars are not capable of being elected

Sizar, Size.

elected fellows; but they may at any time, if they chooſe, become penſioners: and they generally ſit for ſcholarſhips immediately before they take their firſt degree. If ſucceſsful, they are then on the foundation, and are entitled to become candidates for fellowſhips when they have got that degree. In the mean time, while they continue ſizars, beſides free commons they enjoy many benefactions, which have been made at different times, under the name of *ſizar's prætor*, *exhibitions*, &c. and the rate of tuition, the rent of rooms, and other things of that ſort within their reſpective colleges, is leſs than to the other orders. But though their education is thus obtained at a leſs expence, they are not now conſidered as a menial order; for ſizars, penſioner-ſcholars, and even ſometimes fellow-commoners, mix together with the utmoſt cordiality. It is worthy of remark, that at every period this order has ſupplied the univerſity with its moſt diſtinguiſhed officers; and that many of the moſt illuſtrious members of the church, many of the moſt diſtinguiſhed men in the other liberal profeſſions, have, when under-graduates, been ſizars, when that order was on a leſs reſpectable footing than it is now.

SIZE, the name of an inſtrument uſed for finding the bigneſs of fine round pearls. It conſiſts of thin pieces or leaves, about two inches long, and half an inch broad, faſtened together at one end by a rivet. In each of theſe are round holes drilled of different diameters. Thoſe in the firſt leaf ſerve for meaſuring pearls from half a grain to ſeven grains; thoſe of the ſecond, for pearls from eight grains or two carats to five carats, &c.; and thoſe of the third, for pearls from ſix carats and a half to eight carats and a half.

SIZE, is alſo a ſort of paint, varniſh, or glue, uſed by painters, &c.

The ſhreds and parings of leather, parchment, or vellum, being boiled in water and ſtrained, make ſize. This ſubſtance is much uſed in many trades.—The manner of uſing ſize is to melt ſome of it over a gentle fire; and ſcraping as much whiting into it as will juſt colour it, let them be well incorporated together; after which you may whiten frames, &c. with it. After it dries, melt the ſize again, and put more whiting, and whiten the frames, &c. ſeven or eight times, letting it dry between each time: but before it is quite dry, between each waſhing with ſize, you muſt ſmooth and wet it over with a clean bruſh-pencil in fair water.

To make gold-ſize. Take gum-anime and aſphaltum, of each one ounce; minium, litharge of gold, and amber, of each half an ounce: reduce all into a very fine powder, and add to them four ounces of linſeed oil, and eight ounces of drying oil: digeſt them over a gentle fire that does not flame, ſo that the mixture may only ſimmer, but not boil; leſt it ſhould run over and ſet the houſe on fire, ſtir it conſtantly with a ſtick till all the ingredients are diſſolved and incorporated, and do not leave off ſtirring till it becomes thick and ropy; after being ſufficiently boiled, let it ſtand till it is almoſt cold, and then ſtrain it through a coarſe linen cloth, and keep it for uſe.—To prepare it for working, put what quantity you pleaſe in a horſe-muſcle ſhell, adding as much oil of turpentine as will diſſolve it; and making it as thin as the bottom of your ſeed-lac varniſh, hold it over a candle, and then ſtrain it through a linen-rag into another ſhell; add to theſe as much vermilion as will make it of a darkiſh red: if it is too thick for drawing, you may thin it with ſome oil of turpentine. The chief uſe of this ſize is for laying on metals.

Size, Skating.

The beſt gold ſize for burniſhing is made as follows: Take fine bole, what quantity you pleaſe; grind it finely on a piece of marble, then ſcrape into it a little beef ſuet; grind all well together; after which mix in a ſmall proportion of parchment-ſize with a double proportion of water, and it is done.

To make ſilver-ſize. Take tobacco-pipe clay in fine powder, into which ſcrape ſome black-lead and a little Genoa ſoap, and grind them all together with parchment ſize as already directed.

SKATING, an exerciſe on ice, both graceful and healthy. Although the ancients were remarkable for their dexterity in moſt of the athletic ſports, yet ſkating ſeems to have been unknown to them. It may therefore be conſidered as a modern invention; and probably it derived its origin in Holland, where it was practiſed, not only as a graceful and elegant amuſement, but as an expeditious mode of travelling when the lakes and canals were frozen up during winter. In Holland long journeys are made upon ſkates with eaſe and expedition; but in general leſs attention is there paid to graceful and elegant movements, than to the expedition and celerity of what is called *journey ſkating*. It is only in thoſe countries where it is conſidered as an amuſement, that its graceful attitudes and movements can be ſtudied; and there is no exerciſe whatever better calculated to ſet off the human figure to advantage. The acquirement of moſt exerciſes may be attained at an advanced period of life; but to become an expert ſkater, it is neceſſary to begin the practice of the art at a very early age. It is difficult to reduce the art of ſkating to a ſyſtem. It is principally by the imitation of a good ſkater that a young practitioner can form his own practice. The Engliſh, though often remarkable for feats of agility upon ſkates, are very deficient in gracefulneſs: which is partly owing to the conſtruction of the ſkates. They are too much curved in the ſurface which embraces the ice, conſequently they involuntarily bring the uſers of them round on the outſide upon a quick and ſmall circle; whereas the ſkater, by uſing ſkates of a different conſtruction, leſs curved, has the command of his ſtroke, and can enlarge or diminiſh the circle according to his own wiſh and deſire. The metropolis of Scotland has produced more inſtances of elegant ſkaters than perhaps any other country whatever; and the inſtitution of a ſkating club about 50 years ago, has contributed not a little to the improvement of this elegant amuſement. We are indebted for this article to a gentleman of that club, who has made the practice and improvement of ſkating his particular ſtudy; and as the nature of our work will not permit the inſertion of a full treatiſe on ſkating, we ſhall preſent our readers with a few inſtructions.

Thoſe who wiſh to be proficients ſhould begin at an early period of life; and ſhould firſt endeavour to throw off the fear which always attends the commencement of an apparently hazardous amuſement. They will ſoon acquire a facility of moving on the inſide: when they have done this, they muſt endeavour to acquire the movement on the outſide of the ſkates; which is nothing more than throwing themſelves upon the outer edge of the ſkate, and making the balance of their body tend towards

Skating, Skeleton.

towards that ſide, which will neceſſarily enable them to form a ſemicircle. In this, much aſſiſtance may be derived from placing a bag of lead-ſhot in the pocket next to the foot employed in making the outſide ſtroke, which will produce an artificial poiſe of the body, which afterwards will become natural by practice. At the commencement of the outſide ſtroke, the knee of the employed limb ſhould be a little bended, and gradually brought to a rectilineal poſition when the ſtroke is completed. When the practitioner becomes expert in forming the ſemicircle with both feet, he is then to join them together, and proceed progreſſively and alternately with both feet, which will carry him forward with a graceful movement. Care ſhould be taken to uſe very little muſcular exertion, for the impelling motion ſhould proceed from the mechanical impulſe of the body thrown into ſuch a poſition as to regulate the ſtroke. At taking the outſide ſtroke, the body ought to be thrown forward eaſily, the unemployed limb kept in a direct line with the body, and the face and eyes directly looking forward: the unemployed foot ought to be ſtretched towards the ice, with the toes in a direct line with the leg. In the time of making the curve, the body muſt be gradually, and almoſt imperceptibly, raiſed, and the unemployed limb brought in the ſame manner forward; ſo that, at finiſhing the curve, the body will bend a ſmall degree backward, and the unemployed foot will be about two inches before the other, ready to embrace the ice and form a correſpondent curve. The muſcular movement of the whole body muſt correſpond with the movement of the ſkate, and ſhould be regulated ſo as to be almoſt imperceptible to the ſpectators. Particular attention ſhould be paid in carrying round the head and eyes with a regular and imperceptible motion; for nothing ſo much diminiſhes the grace and elegance of ſkating as ſudden jerks and exertions, which are too frequently uſed by the generality of ſkaters. The management of the arms likewiſe deſerves attention. There is no mode of diſpoſing of them more gracefully in ſkating outſide, than folding the hands into each other, or uſing a muff.

There are various feats of activity and manœuvres uſed upon ſkates; but they are ſo various that we cannot pretend to detail them. Moving on the outſide is the primary object for a ſkater to attain; and when he becomes an adept in that, he will eaſily acquire a facility in executing other branches of the art. There are few exerciſes but will afford him hints of elegant and graceful attitudes. For example, nothing can be more beautiful than the attitude of drawing the bow and arrow whilſt the ſkater is making a large circle on the outſide: the manual exerciſe and military ſalutes have likewiſe a pretty effect when uſed by an expert ſkater.

SKELETON, in *Anatomy*, the dried bones of any animal joined together by wires, or by the natural ligament dried, in ſuch a manner as to ſhow their poſition when the creature was alive.

We have, in the Philoſophical Tranſactions, an account of a human ſkeleton, all the bones of which were ſo united, as to make but one articulation from the back to the os ſacrum, and downwards a little way. On ſawing ſome of them, where they were unnaturally joined, they were found not to cohere throughout their whole ſubſtance, but only about a fixth of an inch deep all round. The figure of the trunk was crooked, the ſpinæ making the convex, and the inſide of the vertebræ the concave part of the ſegment. The whole had been found in a charnel-houſe, and was of the ſize of a full grown perſon.

Skids || Skull.

SKIDS, or SKEEDS, in ſea-language, are long compaſſing pieces of timber, notched below ſo as to fit cloſely upon the wales, extending from the main-wale to the top of the ſide, and retained in this poſition by bolts or ſpike-nails. They are intended for preſerving the planks of the ſide, when any heavy body is hoiſted or lowered.

SKIE, ISLE OF. See SKYE.

SKIFF, a ſmall boat reſembling a yawl, uſually employed for paſſing rivers.

SKIMMER, BLACK. See RHYNCHOPS, ORNITHOLOGY *Index*.

SKIMMIA, a genus of plants belonging to the tetrandria claſs; and in the natural method ranking under the 40th order, *Perſonatæ*. See BOTANY *Index*.

SKIN, in *Anatomy*, the general covering of the body of any animal. See ANATOMY, N° 74.

SKIN, in *Commerce*, is particularly uſed for the membrane ſtripped off the animal to be prepared by the tanner, ſkinner, parchment-maker, &c. and converted into leather, &c. See TANNING.

SKINNER, STEPHEN, an Engliſh antiquarian, was born in 1622. He travelled, and ſtudied in ſeveral foreign univerſities during the civil wars; and in 1654, returned and ſettled at Lincoln, where he practiſed phyſic with ſucceſs until the year 1667, when he died of a malignant fever. His works were collected in folio in 1671, by Mr Henſhaw, under the title of *Etymologicon Linguæ Anglicanæ*, &c.

SKIPPER, or SAURY, a ſpecies of fiſh. See ESOX, ICHTHYOLOGY *Index*.

SKIRMISH, in *War*, a ſlight engagement between ſmall parties, without any regular order; and is therefore eaſily diſtinguiſhed from a *battle*, which is a general engagement between two armies continued for ſome time.

SKIRMISH Bay, the name given by Lieutenant Broughton to a bay in an iſland which was diſcovered by him in latitude 43° 48′ ſouth, and in longitude 183° eaſt. The Chatham armed tender worked up into the bay, and came to anchor about a mile from the ſhore. When the captain and ſome of the people landed, they found the natives ſo extremely inhoſpitable, that ſelf-preſervation made it neceſſary to fire upon them. The land is of conſiderable magnitude, whether iſland or continent, and what they ſaw of it extended nearly 40 miles from eaſt to weſt, and the appearance of the country they regarded as very promiſing. The natives reſemble thoſe of New Zealand, from which they are diſtant about 100 leagues, but their ſkins were deſtitute of any marks, and they ſeemed to be cleanly in their perſons. Their dreſſes were of ſeal ſkin, while ſome had fine mats faſtened round the waiſt. Mr Broughton ſays, "on our firſt landing, their ſurpriſe and exclamations can hardly be imagined; they pointed to the ſun, and then to us, as if to aſk whether we had come from thence?" The arms they made uſe of were clubs, ſpears, and a ſmall weapon reſembling the patoo of New Zealand.

SKULL, in *Anatomy*, the bony caſe in which the brain is encloſed. See ANATOMY, N° 11, &c.

Skull || Skye.

Skull-Cap. See Scutellaria, Botany *Index*.

SKY, the blue expanſe of air or atmoſphere. For the reaſon of its blue colour and concave figure, ſee Optics, N° 223.

SKYE, one of the greateſt of the Weſtern iſlands of Scotland, ſo called from *Skianach*, which in the Erſe dialect ſignifies *winged*, becauſe the two promontories of Valerneſs and Toterniſh, by which it is bounded on the north-weſt and north-eaſt, are ſuppoſed to reſemble wings. The iſland lies between the ſhire of Roſs and the weſtern part of Lewis. According to the computation of Mr Pennant, Dr Johnſon, and Dr Campbell, it is 60 miles in length, and nearly the ſame in width where broadeſt; according to others it is 50 miles in length, and in ſome places 30 broad. The iſland of Skye was formerly divided between two proprietors; the ſouthern part belonged to the laird of Macleod, ſaid to be lineally deſcended from Leod ſon to the black prince of Man, but part of this diviſion has fallen into other hands: the northern diſtrict is the property of Lord Macdonald, whoſe anceſtor was Donald, king or lord of the iſles, and chief of the numerous clan of Macdonalds, who are counted the moſt warlike of all the Highlanders. Skye is part of the ſhire of Inverneſs, and formerly belonged to the dioceſe of the Iſles: on the ſouth it is parted from the main land by a channel three leagues in breadth; though, at the ferry of Glenelg, it is ſo narrow that a man may be heard calling for the boat from one ſide to the other. Skye is well provided with a variety of excellent bays and harbours.

The face of the country is roughened with mountains, ſome of which are ſo high as to be covered with ſnow on the top at midſummer; in general, their ſides are clothed with heath and graſs, which afford good paſturage for ſheep and black cattle. Between the mountains there are ſome fertile valleys, and the greater part of the land towards the ſea-coaſt is plain and arable. The iſland is well watered with a great number of rivers, above 30 of which afford ſalmon; and ſome of them produce black muſcles in which pearls are bred, particularly the rivers Kilmartin and Ord: Martin was aſſured by the proprietor of the former, that a pearl hath been found in it valued at 20l. Sterling. Here is alſo a conſiderable number of freſh-water lakes well ſtored with trout and eels. The largeſt of theſe lakes takes its denomination from St Columba, to whom is dedicated a chapel that ſtands upon a ſmall iſle in the middle of the lake. Skye likewiſe affords ſeveral cataracts, that roar down the rocks with great impetuoſity. That the iſland has been formerly covered with woods, appears from the large trunks of fir and other trees daily dug out of the bogs and peat-marſhes in every part of the country.

Statiſtical Account of Scotland, vol. xvi. p. 140.

From the height of the hills, and proximity of the ſea, the air ſeldom continues long of the ſame temperature; ſometimes it is dry, oftener moiſt, and in the latter end of winter and beginning of ſpring cold and piercing; at an average, three days in twelve throughout the year ſcarcely free from rain, far leſs from clouds. Theſe, attracted by the hills, ſometimes break in uſeful and refreſhing ſhowers; at other times ſuddenly burſting, pour down their contents with tremendous noiſe, in impetuous torrents that deluge the plains below, and render the ſmalleſt rivulet impaſſable; which, together with the ſtormy winds ſo common in this country in the months of Auguſt and September, frequently blaſt the hopes, and diſappoint the expectations, of the huſbandman. Snow has been often known to lie on the ground from three to ſeven weeks; and on the higheſt hills, even in the middle of June, ſome ſpots of it are to be ſeen. To this various temperature of the air, and uncertainty of weather, the fevers and agues, headachs, rheumatiſms, colds, and dyſenteries, which are the prevailing diſtempers, may be aſcribed. That it is far, however, from being unwholeſome, is ſufficiently evinced by experience; for the inhabitants are, in general, as ſtrong and healthy, and arrive at as advanced an age, as thoſe who live in milder climates, and under a ſerener ſky. The gout is ſcarcely known in this iſland. Skye.

The ſoil is generally black, though it likewiſe affords clay of different colours; ſuch as white, red, and blue, and in ſome places fuller's earth. It is, however, much leſs adapted for agriculture than for paſture, and ſeldom, unleſs, in very good years, ſupplies itſelf with a ſufficiency of proviſions. Yet, though the ſoil is not very fertile or rich, it might with proper management be made to produce more plentiful crops. But the generality of the farmers are ſo prejudiced in favour of old cuſtoms, and indeed ſo little inclined to induſtry, that they will not eaſily be prevailed on to change them for better; eſpecially if the alteration or amendment propoſed be attended with expence. Therefore, with reſpect to improvements in agriculture, they are ſtill much in the ſame ſtate as they were 20 or 30 years ago. Ploughs, on a new and improved model, that in compariſon to the advantages derived from them might be had at a moderate expence, have lately been introduced into ſeveral diſtricts around, where their good effects are manifeſt in improving the crops and diminiſhing the labour of man and beaſt; but the laird of Raaſay and one other gentleman are the only perſons in Portree that have uſed them. The *caſcroim*, a crooked kind of ſpade, is almoſt the only inſtrument for labouring the ground uſed among the ordinary claſs of tenants. The average crops of corn are 8000 bolls.

When Mr Knox viſited this iſland in 1786, the number of inhabitants amounted to 15,000: but between 1790-98, according to the Statiſtical Hiſtory of Scotland, the population is only 14,470.

Various minerals are found in Skye, but none have been wrought to any advantage. Near the village of Sartle, the natives find black and white marcaſites, and variegated pebbles. The Appleſglen, in the neighbourhood of Lochfallart, produces beautiful agates of different colours: ſtones of a purple hue are, after great rains, found in the rivulets: cryſtal, of different colours and forms, abounds in ſeveral parts of the iſland, as well as black and white marble, free-ſtone, lime-ſtone, and talc: ſmall red and white coral is found on the ſouthern and weſtern coaſts in great abundance. The fuel conſiſts chiefly of peat and turf, which are impregnated with iron ore; and coal has been diſcovered in ſeveral diſtricts; but it does not appear to be worth working.

The wild birds of all ſorts moſt common in the country, are, ſolan geeſe, gulls, cormorants, cranes, wild geeſe, and wild ducks; eagles, crows, ravens, rooks, cuckoos, rails, woodcocks, moor-fowl, partridges, plover, wild pigeons, and blackbirds, owls, hawks, ſnipes, and

Skye. a variety of ſmall birds. In mild ſeaſons, the cuckoo and rail appear in the latter end of April; the former diſappears always before the end of June; the latter ſometimes not till September. The woodcock comes in October, and frequently remains till March. The tame ſorts of fowl are geeſe, ducks, turkeys, cocks, pullets, and tame pigeons.

The black cattle are here expoſed to all the rigours of the ſevere winter, without any other provender than the tops of the heath and the alga marina; ſo that they appear like mere ſkeletons in the ſpring; though, as the graſs grows up, they ſoon become plump and juicy, the beef being ſweet, tender, and finely interlarded.—The amphibious animals are ſeals and otters. Among the reptiles may be reckoned vipers, aſps, frogs, toads, and three different kinds of ſerpents; the firſt ſpotted black and white, and very poiſonous; the ſecond yellow, with brown ſpots; and the third of a brown colour, the ſmalleſt and leaſt poiſonous.

Whales, and cairbans or ſun-fiſh, come in ſometimes to the ſounds after their prey, but are rarely purſued with any ſucceſs. The fiſhes commonly caught on the coaſt are herrings, ling, cod, ſkate, haddock, mackerel, lythe, ſye, and dog-fiſh. The average price of ling at home is 13l. 13s. per ton; when ſold, one by one, if freſh, the price is from 3d. to 5d.; if cured, from 5d. to 7d. The barrel of herrings ſeldom ſells under 19s. which is owing to the great difficulty of procuring ſalt, even ſometimes at any price; and the ſame cauſe prevents many from taking more than are ſufficient for their own uſe.

The kyle of Scalpe teems with oyſters, in ſuch a manner, that after ſome ſpring-tides, 20 horſe-loads of them are left upon the ſands. Near the village of Bernſtill, the beach yields muſcles ſufficient to maintain 60 perſons per day; this providential ſupply helps to ſupport many poor families in times of ſcarcity.

The people are ſtrong, robuſt, healthy, and prolific. They generally profeſs the Proteſtant religion; are honeſt, brave, innocent, and hoſpitable. They ſpeak the language, wear the habit, and obſerve the cuſtoms that are common to all the Hebrides. The meconium in new-born infants is purged away with freſh butter: the children are bathed every morning and evening in water, and grow up ſo ſtrong, that a child of 10 months is able to walk alone: they never wear ſhoes or ſtockings before the age of eight or ten, and night-caps are hardly known; they keep their feet always wet; they lie on beds of ſtraw or heath, which laſt is an excellent reſtorative: they are quick of apprehenſion, ingenious, and very much addicted to muſic and poetry. They eat heartily of fiſh; but ſeldom regale themſelves with fleſh-meat: their ordinary food conſiſts of butter, cheeſe, milk, potatoes, colewort, brochan, and a diſh called *oon*, which indeed is no other than the froth of boiled milk or whey raiſed with a ſtick like that uſed in making chocolate.

A ſort of coarſe woollen cloth called *cloa*, or *caddoes*, the manufacture of their wives, made into ſhort jackets and trouſers, is the common dreſs of the men. The philibeg is rarely worn, except in ſummer and on Sundays; on which days, and ſome other occaſions, thoſe in better circumſtances appear in tartans, a bonnet, and ſhort hoſe, and ſome in a hat, ſhort coat, waiſtcoat, and breeches, of Scotch or Engliſh manufacture. The women are in general very cleanly, and ſo exceſſively fond of dreſs, that many maid-ſervants are often known to lay out their whole wages that way. Skye || Slavery.

There are two fairs held annually at Portree, to which almoſt every part of Sky ſends cattle. The firſt is held in the end of May, and the ſecond in the end of July. The fair commonly continues from Wedneſday till the Saturday following. The commodities which are ſold in theſe are horſes, cows, ſheep, goats, hides, butter, cheeſe, fiſh, and wool. The cattle ſold in theſe fairs ſwim over to the main land through a mile or half a mile of ſea. Thouſands of theſe are yearly exported, at from 2l. to 3l. each. Many of them are driven to England, where they are fatted for the market, and counted delicious eating.

In Skye appear many ruins of Daniſh forts, watch-towers, beacons, temples, and ſepulchral monuments. All the forts are known by the term *Dun;* ſuch as Dun-Skudborg, Dun-Derig, Dun-Skerineſs, Dun-David, &c.

SKY-Colour. To give this colour to glaſs, ſet in the furnace a pot of pure metal of fritt from rochetta or barilla, but the rochetta fritt does beſt; as ſoon as the metal is well purified, take for a pot of twenty pounds of metal ſix ounces of braſs calcined by itſelf; put it by degrees at two or three times into the metal, ſtirring and mixing it well every time, and diligently ſkimming the metal with a ladle: at the end of two hours the whole will be well mixed, and a proof may be taken; if the colour be found right, let the whole ſtand 24 hours longer in the furnace, and it will then be fit to work, and will prove of a moſt beautiful ſky colour.

SLAB, an outſide ſappy plank or board ſawed off from the ſides of a timber-tree. The word is alſo uſed for a flat piece of marble.

SLAB-Line, in ſea-language, a ſmall cord paſſing up behind a ſhip's main-ſail, or fore-ſail, and being reeved through a block attached to the lower part of the yard, is thence tranſmitted in two branches to the foot of the ſail, to which it is faſtened. It is uſed to truſs up the ſail as occaſion requires, and more particularly for the convenience of the pilot or ſteerſman, that they may look forward beneath it as the ſhip advances.

SLACK-WATER, in ſea-language, denotes the interval between the flux and reflux of the tide, or between the laſt of the ebb and the firſt of the flood, during which the current is interrupted, and the water apparently remains in a ſtate of reſt.

SLACKEN, in *Metallurgy*, a term uſed by miners to expreſs a ſpongy and ſemivitrified ſubſtance which is mixed with the ores of metals, to prevent their fuſion. It is the ſcoria or ſcum ſeparated from the ſurface of the former fuſions of metals. To this is frequently added limeſtone, and ſometimes a kind of coarſe iron-ore, in the running of the poorer gold ores.

SLATE, a ſtone of a compact texture and laminated ſtructure, ſplitting into fine plates, ſome varieties of which are employed for covering houſes. See *Clay-Slate*, under MINERALOGY, p. 185. See alſo GEOLOGY.

SLAVE. See SLAVERY.

SLAVERY is a word, of which though generally underſtood, it is not eaſy to give a proper definition. An excellent moral writer has defined it to be "an obligation to labour for the benefit of the maſter, without the contract or conſent of the ſervant." But may not he Slavery defined.

be

Slavery. be properly called a ſlave who has given up his freedom to diſcharge a debt which he could not otherwiſe pay, or who has thrown it away at a game of hazard? In many nations, debts have been legally diſcharged in this manner; and in ſome ſavage tribes, ſuch is the univerſal ardour for gaming, that it is no uncommon thing for a man, after having loſt at play all his other property, to ſtake, on a ſingle throw of dice, himſelf, his wife, and his children (A). That perſons who have thus loſt their liberty are ſlaves, will hardly be denied; and ſurely the infatuated gameſter is a ſlave by his own contract. The debtor, too, if he was aware of the law, and contracted debts larger than he could reaſonably expect to be able to pay, may juſtly be conſidered as having come under an obligation to labour for the benefit of a maſter *with his own conſent*; for every man is anſwerable for all the known conſequences of his voluntary actions.

This definition of ſlavery ſeems to be defective as well as inaccurate. A man may be under an obligation to labour through life for the benefit of a maſter, and yet that maſter have no right to diſpoſe of him by ſale, or in any other way to make him the property of a third perſon; but the word *ſlave*, as uſed among us, always denotes a perſon who may be bought and ſold like a beaſt in the market (B). In its original ſenſe, indeed, it was of the ſame import with *noble*, *illuſtrious*; but vaſt numbers of the people among whom it had that ſignification being, in the decline of the Roman empire, ſold by their countrymen to the Venetians, and by them diſperſed over all Europe, the word *ſlave* came to denote a perſon in the loweſt ſtate of ſervitude, who was conſidered as the abſolute property of his maſter. See PHILOLOGY, N° 220.

2 Inequalities of rank inevitable. As nothing can be more evident than that all men have, by the law of nature, an equal right to life, liberty, and the produce of their own labour (ſee RIGHT, N° 5.), it is not eaſy to conceive what can have firſt led one part of them to imagine that they had a right to enſlave another. Inequalities of rank are indeed inevitable in civil ſociety; and from them reſults that ſervitude which is founded in contract, and is of temporary duration. (See MORAL PHILOSOPHY, N° 141.) He who has much property has many things to attend to, and muſt be diſpoſed to hire perſons to aſſiſt and ſerve him; while thoſe who have little or no property muſt be equally willing to be hired for that purpoſe. And if the maſter be kind, and the ſervant faithful, they will both be happier in this connection than they could have been out of it. But from a ſtate of ſervitude, where the ſlave is at the abſolute diſpoſal of his maſter in all things, and may be transferred without his own conſent from one proprietor to another, like an ox or an aſs, happineſs muſt be for ever baniſhed. How then came a traffic ſo unnatural and unjuſt as that of ſlaves to be originally introduced into the world? Slavery.

The common anſwer to this queſtion is, that it took its riſe among ſavages, who, in their frequent wars with each other, either maſſacred their captives in cold blood, or condemned them to perpetual ſlavery. In ſupport of this opinion we have heard it obſerved, that the Latin word *ſervus*, which ſignifies not a *hired* ſervant, but a *ſlave*, is derived from *ſervare*, "to preſerve;" and that ſuch men were called *ſervi*, becauſe they were captives, whoſe lives were preſerved on the condition of their becoming the property of the victor.

3 Origin of ſlavery. That ſlavery had its origin from war, we think extremely probable (C), nor are we inclined to controvert this etymology of the word *ſervus*; but the traffic in men prevailed almoſt univerſally long before the Latin language or Roman name was heard of; and there is no good evidence that it began among ſavages. The word עבד, in the Old Teſtament, which in our verſion is rendered *ſervant*, ſignifies literally a *ſlave*, either born in the family or bought with money, in contradiſtinction to שביר, which denotes a hired ſervant: and as Noah

4 Prior to the deluge. makes uſe of the word עבד in the curſe which he denounces upon Ham and Canaan immediately after the deluge, it would appear that ſlavery had its origin before that event. If ſo, there can be little doubt but that it began among thoſe violent perſons whom our tranſlators have called *giants* *, though the original word נפלים literally ſignifies *aſſaulters of others*. Thoſe wretches ſeem firſt to have ſeized upon women, whom they forcibly compelled to miniſter to their pleaſures; and from this kind of violence the progreſs was natural to that by which they enſlaved their weaker brethren among the men, obliging them to labour for their benefit, without allowing them fee or reward. * Gen. vi. 4.

4 Nimrod enſlaved his captives. After the deluge the firſt dealer in ſlaves ſeems to have been Nimrod. "He began," we are told, "to be a mighty one in the earth, and was a mighty hunter before the Lord." He could not, however, be the firſt hunter of wild beaſts; for that ſpecies of hunting muſt have been practiſed from the beginning; nor is it probable that his dexterity in the chaſe, which was then the univerſal employment, could have been ſo far ſuperior to that of all his contemporaries, as to entitle him to the appellation of the "the mighty hunter before the Lord." Hence moſt commentators have concluded, that he was a hunter of men; an opinion which they think receives ſome countenance from the import of his name, the word *Nimrod* ſignifying a rebel. Whatever

(A) Aleam (quod mirere) ſobrii inter ſeria exercent, tanta lucrandi perdendive temeritate, ut cum omnia defecerunt, extremo ac noviſſimo jactu de libertate et corpore contendant. Victus voluntariam ſervitutem adit; quamvis junior, quamvis robuſtior, alligari ſe ac venire patitur.—*Tacitus de Mor. Germ.*

The ſavages of North America are equally addicted to gaming with the ancient Germans, and the negroes on the Slave Coaſt of Guinea perhaps ſtill more.

(B) The Roman orator's definition of *ſlavery*, Parad. V. is as accurate as any that we have ſeen. "Servitus eſt obedientia fracti animi et abjecti et arbitrio carentis ſuo;" whether the unhappy perſon fell into that ſtate with or without his own contract or conſent.

(C) In the article SOCIETY, the reader will find another account of the origin of ſlavery, which we think likewiſe probable, though we have not transferred it to this place; as it would, in our opinion, be wrong to give to one writer what we know to belong to another. It may be proper, however, to obſerve here, that between the two articles there is no contradiction, as barbarous wars were certainly *one* ſource of ſlavery.

Slavery.

be in this, there can be little doubt but that he became a mighty one by violence; for being the ſixth ſon of his father, and apparently much younger than the other five, it is not likely that his inheritance exceeded theirs either in extent or in population. He enlarged it, however, by conqueſt; for it appears from Scripture, that he invaded the territories of Aſhur the ſon of Shem, who had ſettled in Shinar; and obliging him to remove into Aſſyria, he ſeized upon Babylon, and made it the capital of the firſt kingdom in the world. As he had great projects in view, it ſeems to be in a high degree probable that he made bond-ſervants of the captives whom he took in his wars, and employed them in building or repairing the metropolis of his kingdom; and hence we think is to be dated the origin of poſtdiluvian ſlavery.

6 Slavery in the days of Abraham.

That it began thus early can hardly be queſtioned; for we know that it prevailed univerſally in the age of Abraham, who was born within ſeventy years after the death of Nimrod. That patriarch had three hundred and eighteen ſervants or ſlaves, born in his own houſe, and trained to arms, with whom he purſued and conquered the four kings who had taken captive his brother's ſon †. And it appears from the converſation which took place between him and the king of Sodom after the battle, that both believed the conqueror had a right to conſider his priſoners as part of his ſpoil. "Give me (ſays the king) the *perſons*, and take the *goods* to thyſelf." It is indeed evident from numberleſs paſſages of ſcripture, that the domeſtics whom our tranſlators call *ſervants* were in thoſe days univerſally conſidered as the moſt valuable part of their maſter's property, and claſſed with his flocks and herds. Thus when the ſacred hiſtorian deſcribes the wealth of Abraham, he ſays, that "he had ſheep and oxen, and he aſſes, and men-ſervants, and maid ſervants, and ſhe-aſſes, and camels." And when Abimelech wiſhed to make ſome reparation to the patriarch for the unintended injury that he had done him, "he took ſheep and oxen, and men-ſervants, and women-ſervants, and gave them unto Abraham, and reſtored to him Sarah his wife." The riches and power of Iſaac and Jacob are eſtimated in the very ſame manner. Of the former it is ſaid, that "the man waxed great, and went forward and grew, until he became very great: for he had poſſeſſion of flocks, and poſſeſſion of herds, and great ſtore of ſervants, עבדת of ſlaves; and the Philiſtines envied him." The latter, we are told, "increaſed exceedingly, and had much cattle, and maid-ſervants, and men-ſervants, and camels, and aſſes ‡."

† Gen. xiv.

‡ Gen. xii. 16. xx. 14. xxiv. 35 xxvi. 13, 14, xxx. 43.

That the practice of buying and ſelling ſervants thus early begun among the patriarchs deſcended to their poſterity, is known to every attentive reader of the Bible. It was expreſsly authoriſed by the Jewiſh law, in which are many directions how ſuch ſervants were to be treated. They were to be bought only of the heathen; for if an Iſraelite grew poor and ſold himſelf either to diſcharge a debt, or to procure the means of ſubſiſtence, he was to be treated not as a ſlave עבד, but as a hired ſervant שביר, and reſtored to freedom at the year of Jubilee. "Both thy bond-men and thy bond maids (ſays Moſes) ſhall be of the heathen that are round about you: of them ſhall ye buy bond-men and bond-maids. And ye ſhall take them as an inheritance for your children after you, to inherit them for a poſſeſſion; they ſhall be your bond-men for ever ‖." Unlimited as the power thus given to the Hebrews over their bond-ſervants of heathen extraction appears to have been, they were ſtrictly prohibited from acquiring ſuch property by any other means than fair purchaſe: "he that *ſtealeth* a man and ſelleth him," ſaid their great lawgiver, "ſhall ſurely be put to death §."

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7 Authoriſed by the Moſaic law.

‖ Lev. xxv. 39, 40, 44, 46.

§ Lev. xxi. 16.

Whilſt ſlavery, in a mild form, was permitted among the people of God, a much worſe kind of it prevailed among the heathen nations of antiquity. With other abominable cuſtoms, the traffic in men quickly ſpread from Chaldea into Egypt, Arabia, and over all the eaſt, and by degrees found its way into every known region under heaven (D).

8 Spread over the whole world.

Of this hateful commerce we ſhall not attempt to trace the progreſs through every age and country, but ſhall content ourſelves with taking a tranſient view of it among the Greeks and Romans, and a few other nations, in whoſe cuſtoms and manners our readers muſt be intereſted.

One can hardly read a book of the Iliad or Odyſſey, without perceiving that, in the age of Homer, all priſoners of war were liable to be treated as ſlaves, and compelled, without regard to their rank, ſex, or years, to labour for their maſters in offices of the vileſt drudgery. So univerſally was this cruel treatment of captives admitted to be the right of the victor, that the poet introduces Hector in the very act of taking a tender and perhaps laſt farewell of his wife, when it was ſurely his buſineſs to afford her every conſolation in his power, telling her, as a thing of courſe which could not be concealed, that, on the conqueſt of Troy, ſhe would be compelled

9 Slavery among the Greeks and

To bear the victor's hard commands, or bring
The weight of water from Hyperia's ſpring (E).
Pope.

At that early period, the Phœnicians, and probably the Greeks themſelves, had ſuch an eſtabliſhed commerce in ſlaves, that, not ſatisfied with reducing to bondage their priſoners of war, they ſcrupled not to kidnap in cold blood

(D) If credit be due to a late account of China, the people of that vaſt empire have never made merchandiſe of men or women. The exception, however, is ſo ſingular, that we ſhould be glad to ſee it better authenticated; for it is apparent from works of the moſt undoubted credit, that over all the other eaſtern countries with which we are acquainted ſlavery has prevailed from time immemorial, and that ſome of the Indian nations make long journeys into Africa for the ſole purpoſe of buying ſlaves.

(E) In thoſe early times drawing water was the office of the meaneſt ſlaves. This appears from Joſhua's curſe upon the Gibeonites who had deceived him.—"Now therefore ye are curſed, and there ſhall none of you be freed from being bond-men, and hewers of wood, and drawers of water, for the houſe of my God." To this ſtate of bondage Homer makes Hector ſay, that Andromache would *neceſſarily* be brought upon the deſtruction of Troy; κραίεφη δ' επικυρσει'ανανκη.—*Iliad.* lib. vi.

Slavery. blood perſons who had never kindled their reſentment, in order to ſupply their foreign markets. In the 14th book of the Odyſſey, Ulyſſes repreſents himſelf as having narrowly eſcaped a ſnare of this kind laid for him by a falſe Phœnician, who had doomed the hero to Libyan ſlavery: and as the whole narrative, in which this circumſtance is told, is an artful fiction, intended to have the appearance of truth to an Ithacan peaſant, the practice of kidnapping ſlaves could not then have appeared incredible to any inhabitant of that iſland.

Such were the manners of the Greeks in the heroic age; nor were they much improved in this reſpect at periods of greater refinement. Philip of Macedon having conquered the Thebans, not only ſold his captives, but even took money for permitting the dead to be buried *; and Alexander, who had more generoſity than Philip, afterwards razed the city of Thebes, and ſold the inhabitants, men, women, and children, for ſlaves †. This cruel treatment of a brave people may indeed be ſuppoſed to have proceeded, in the firſt inſtance, from the avarice of the conqueror; and in the ſecond, from the momentary reſentment of a man who was ſavage and generous by turns, and who had no command of his paſſions. We ſhall not poſitively aſſign it to other cauſes; but from the manner in which the Spartans behaved to their ſlaves, there is little reaſon to imagine that had they received from the Thebans the ſame provocation with Alexander, they would have treated their captives with greater lenity. "At Sparta (ſays a humane and elegant writer) ſlaves were treated with a degree of rigour that is hardly conceivable; although to them, as their huſbandmen and artificers, their proud and idle maſters were indebted for all the neceſſaries of life. The Lacedemonian youth, trained up in the practice of deceiving and butchering thoſe poor men, were from time to time let looſe upon them, in order to ſhow their proficiency in ſtratagem and maſſacre. And once, without any provocation, and merely for their own amuſement, we are told that they murdered three thouſand in one night, not only with the connivance of law, but by its avowed permiſſion. Such, in promoting the happineſs of one part of ſociety and the virtue of another, are the effects of ſlavery."

* *Juſtin.* lib. ii. cap. 4.
† *Juſtin et Arrian*
Beattie's Moral Science, vol. ii.

It has been ſaid, that in Athens and Rome ſlaves were better treated than in Sparta: but in the former city their treatment cannot have been good, or their lives comfortable, when the Athenians reliſhed that tragedy of Euripides in which Hecuba, the wife of Priam, is introduced as lamenting that ſhe was chained like a dog at Agamemnon's gate? Of the eſtimation in which ſlaves were held in Rome, we may form a tolerable notion from the well-known fact, that one of thoſe unhappy beings was often chained at the gate of a great man's houſe, to give admittance to the gueſts invited to a feaſt *. In the early periods of the commonwealth it was cuſtomary, in certain ſacred ſhews exhibited on ſolemn occaſions, to drag through the circus a ſlave, who had been ſcourged to death holding in his hand a fork in the form of a gibbet †. But we need not multiply proofs of the cruelty of the Romans to their ſlaves. If the inhuman combats of the gladiators (ſee GLADIATORS) admit of any apology on account of the martial ſpirit with which they were thought to inſpire the ſpectators, the conduct of Vedius Pollio muſt have proceeded from the moſt wanton and brutal cruelty. This man, who flouriſhed not in the earlieſt periods of the republic, when the Romans were little better than a ſavage banditti, but in the poliſhed age of Auguſtus, frequently threw ſuch ſlaves as gave him the ſlighteſt offence into his fiſhponds to fatten his lampreys; and yet he was ſuffered to die in peace! The emperor, indeed, upon coming to the knowledge of his cruelty, ordered his lampreys to be deſtroyed, and his ponds to be filled up; but we do not recollect that any other puniſhment was inflicted on the ſavage maſter. Till the reign of the ſame emperor the depoſitions of ſlaves were never admitted in the courts of judicature; and then they were received only when perſons were accuſed of treaſonable practices.

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* *Kames's Sketches.*
† *Cicero de Div.* lib. i. cap. 26.

11 Origin of Roman ſlavery.

The origin of ſlavery in Rome was the ſame as in every other country. Priſoners of war were of courſe reduced to that ſtate, as if they had been criminals. The dictator Camillus, one of the moſt accompliſhed generals of the republic, ſold his Hetrurian captives to pay the Roman ladies for the jewels which they had preſented to Apollo. Fabius, whoſe cautious conduct ſaved his country when Hannibal was victorious in Italy, having ſubdued Tarentum, reduced 30,000 of the citizens to ſlavery, and ſold them to the higheſt bidder. Coriolanus, when driven from Rome, and fighting for the Volſci, ſcrupled not to make ſlaves of his own countrymen; and Julius Cæſar, among whoſe faults wanton cruelty has never been reckoned, ſold at one time fifty-three thouſand captives for ſlaves. Nor did the ſlaves in Rome conſiſt only of foreigners taken in war. By one of the laws of the twelve tables, creditors were empowered to ſeize their inſolvent debtors, and keep them in their houſes till, by their ſervices or labour, they had diſcharged the ſum they owed: and in the beginning of the commonwealth they were authoriſed to ſell ſuch debtors, and even to put them to death (F). The children of ſlaves were the property not of the commonwealth, or of their own parents, but of their maſters; and thus was ſlavery perpetuated in the families of ſuch unhappy

10 Romans.

(F) After a certain number of citations, the law granted to the debtor thirty days of grace to raiſe the ſum for which he was accountable. The words of the law are: "Æris confeſſi, rebuſque jure judicatis, triginti dies juſti ſunto. Poſt dein manum endojacito.—Vincito aut nervo, aut compedibus." When the debt is confeſſed, and the trial paſſed, let there be thirty days of forbearance; afterwards lay hands on him; bind him either with a cord or fetters." After the thirty days were expired, if the debtor had not diſcharged the debt, he was led to the prætor, who delivered him over to the mercy of his creditors; theſe bound him and kept him in chains for the ſpace of ſixty days. Afterwards, for three market-days ſucceſſively, the debtor was brought to the tribunal of the prætor; then a public crier proclaimed in the forum the debt for which the priſoner was detained. It often happened, that rich perſons redeemed the priſoner by paying his debts; but if nobody appeared in behalf of the debtor after the third market-day, the creditor had a right to inflict the puniſhments appointed by the law. "Tertiis nundinis capite

Slavery. unhappy men as fell into that ſtate, whether through the chance of war or the cruelty of a ſordid creditor (G). The conſequence was, that the number of ſlaves belonging to the rich patricians was almoſt incredible. Caius Cæcilius Iſidorus, who died about ſeven years before the Chriſtian era, left to his heirs 4116 ſlaves; and if any one of thoſe wretched creatures made an unſucceſsful attempt to regain his liberty, or was even ſuſpected of ſuch a deſign, he was marked on the forehead with a red-hot iron (H). In Sicily, during the moſt flouriſhing periods of the commonwealth, it ſeems to have been cuſtomary for maſters to mark their ſlaves in this manner; at leaſt we know that ſuch was the practice of Damophilus, who, not ſatisfied with this ſecurity, ſhut up his ſlaves every night in cloſe priſons, and led them out like beaſts in the morning to their daily labour in the field. Hence aroſe the ſervile war in Sicily.

12 Its duration. Though many laws were enacted by Auguſtus and other patriotic emperors to diminiſh the power of creditors over their inſolvent debtors; though the influence of the mild ſpirit of Chriſtianity tended much to meliorate the condition of ſlaves, even under Pagan maſters; and though the emperor Adrian made it capital to kill a ſlave without a juſt reaſon; yet this infamous commerce prevailed univerſally in the empire for many ages after the converſion of Conſtantine to the religion of Chriſt. It was not indeed completely aboliſhed even in the reign of Juſtinian; and in many countries which had once been provinces of the empire it continued long after the empire itſelf had fallen to pieces.

13 Slavery among the ancient Germans. It has already been obſerved, that among the ancient Germans it was not uncommon for an ardent gameſter to loſe his perſonal liberty by a throw of the dice. This was indeed a ſtrong proof of ſavage manners; but the general condition of ſlaves among thoſe ſavages ſeems to have been much better than among the poliſhed Greeks and Romans. In Germany the ſlaves were generally attached to the ſoil, and only employed in tending cattle, and carrying on the buſineſs of agriculture; for the menial offices of every great man's houſe were performed by his wife and children. Such ſlaves were ſeldom beaten, or chained, or impriſoned. Sometimes indeed they were killed by their maſters in a fit of ſudden paſſion; but none were conſidered as materials of commerce, except thoſe who had originally been freemen, and loſt their freedom by play. Theſe, indeed, the ſucceſsful gameſter was very ready to ſell, both becauſe he felt them an uſeleſs burden, and becauſe their preſence continually put him in mind of that ſtate to which a throw of the dice might one day reduce himſelf. Slavery.

Such is the account which Tacitus gives * of ſlavery among the ancient Germans. The Anglo-Saxons, however, after they were ſettled in this iſland ſeem not to to have carried on that traffic ſo honourably. By a ſtatute of Alfred the Great †, the purchaſe of a *man*, a *horſe*, or an *ox*, without a voucher to warrant the ſale, was ſtrictly forbidden. That law was, doubtleſs, enacted to prevent the *ſtealing* of *men* and cattle; but it ſhows us that ſo late as the ninth or tenth century a man, when fairly purchaſed, was, in England, as much the property of the buyer as the horſe on which he rode, or the ox which dragged his plough. In the ſame country, now ſo nobly tenacious of freedom and the rights of man, a ſpecies of ſlavery ſimilar to that which prevailed among the ancient Germans ſubſiſted even to the end of the ſixteenth century. This appears from a commiſſion iſſued by Queen Elizabeth in 1574, for inquiring into the lands and goods of all her *bond-men* and *bond-women* in the counties of Cornwall, Devon, Somerſet, and Glouceſter, in order to compound with them for their manumiſſion, that they might enjoy their lands and goods as freemen ‡. In Scotland there certainly exiſted an order of ſlaves or bond-men, who tilled the ground, were attached to the ſoil, and with it were transferable from one proprietor to another, at a period ſo late as the thirteenth century; but when or how thoſe villains, as they were called, obtained their freedom, ſeems to be unknown to every lawyer and antiquary of the preſent day. Coalliers and ſalters were, in the ſame country, ſlaves till little more than 30 years ago, that they were manumitted by an act of the Britiſh legiſlature, and reſtored to the rights of freemen and citizens. Before that period the ſons of coalliers could follow no buſineſs but that of their fathers; nor were they at liberty to ſeek employment in any other mines than thoſe to which they were attached by birth, without the conſent of the lord of the manor, who, if he had no uſe for their ſervices himſelf, transferred them by a written deed to ſome neighbouring proprietor.

* *De Mor. Germ.* 24, 25.

† *Wilkin's Collection of Laws from Ethelbert to Henry III.*

14 In England and

‡ *Kames's Sketches*, book i. ſketch 5.

15 Scotland.

That the ſavage nations of Africa were at any period

16 Slavery among the Carthaginians,

capite pœnas dato aut trans Tiberim peregre venumduito;" that is, "Let him on the third market-day be puniſhed with death, or ſold beyond the Tiber as a ſlave." If there were ſeveral creditors, they were allowed, in conſequence of this ſevere law, to divide the body of the priſoner into ſeveral parts, and ſhare it among them in proportion to the ſum which they demanded.

(G) This is evident from the ſtory of Appius and Virginia. See ROME, N° 113.

(H) How capriciouſly and unjuſtly this infamous mark was impreſſed, we learn from the ſtory of Reſtio. This man being proſcribed, and a reward offered for his head by the triumvirs Octavianus, Antony, and Lepidus, concealed himſelf from the fury of the tyrants in the beſt way that he could. A ſlave whom he had marked with the hot iron having found out the place of his retreat, conducted him to a cave, and there ſupported him for ſome time with what he earned by his daily labour. At length a company of ſoldiers coming that way, and approaching the cave, the faithful ſlave, alarmed at the danger his maſter was in, followed them cloſe, and falling upon a poor peaſant, killed him in their preſence, and cut off his head, crying out, "I am now revenged on my maſter for the marks with which he has branded me." The ſoldiers, ſeeing the infamous marks on his forehead, and not doubting but he had killed Reſtio, ſnatched the head out of his hand, and returned with it in all haſte to the triumvirs. They were no ſooner gone, than the ſlave conveyed his maſter to the ſea-ſide, where they had the good luck to find one of Sextius Pompeius's veſſels, which tranſported them ſafe into Sicily.

Slavery. of history exempted from this opprobrium of our nature which spread over all the rest of the world, the enlightened reader will not suppose. It is indeed in that vast country that slavery has in every age appeared in its ugliest form. We have already observed, that about the era of the Trojan war, a commerce in slaves was carried on between Phœnicia and Libya: and the Carthaginians, who were a colony of Phœnicians, and revered the customs, manners, and religion of their parent state, undoubtedly continued the Tyrian traffic in human flesh with the interior tribes of Africa. Of this we might rest assured, although we had no other evidence of the fact than what results from the practice of human sacrifices so prevalent in the republic of Carthage. The genuine instincts of nature are often subdued by dire superstition, but they cannot be wholly eradicated; and the rich Carthaginian, when a human victim was demanded from him to the gods, would be ready to supply the place of his own child by the son of a poor stranger, perfidiously purchased at whatever price. That this was, indeed, a very common practice among them, we learn from the testimony of various historians *, who assure us, that when Agathocles the tyrant of Syracuse had overthrown their generals Hanno and Bomilcar, and threatened Carthage itself with a siege, the people attributed their misfortunes to the just anger of Saturn for having been worshipped, for some years, by the sacrifices of children meanly born and secretly *bought*, instead of those of noble extraction. These substitutions of one offering for another were considered as a profane deviation from the religion of their forefathers; and therefore to expiate the guilt of so horrid an impiety, a sacrifice of 200 children of the first rank was on that occasion made to the bloody god. As the Carthaginians were a commercial people, we cannot suppose that they purchased slaves only for sacrifices. They undoubtedly condemned many of their prisoners of war to the state of servitude, and either sold them to foreigners, or distributed them among their senators and the leaders of their armies. Hanno, who endeavoured to usurp the supreme power in Carthage whilst that republic was engaged in war with Timoleon in Sicily †, armed 20,000 of his slaves in order to carry his nefarious purpose into execution; and Hannibal, after his decisive victory at Cannæ, sold to the Greeks many of his prisoners whom the Roman senate refused to redeem ‡. That illustrious commander was indeed more humane, as well as more politic, than the generality of his countrymen. Before his days it was customary with the Carthaginians either to massacre their captives in cold blood, that they might never again bear arms against them, or to offer them in sacrifice as a grateful acknowledgement to the gods by whose assistance they believed that they were vanquished; but this was not always done even by their most superstitious or most unprincipled leaders. Among other rich spoils which Agathocles, after his victory already mentioned, found in the camp of Hanno and Bomilcar, were twenty thousand pair of fetters and manacles, which those generals had provided for such of the Sicilian prisoners as they intended to preserve alive and reduce to a state of slavery.

* *Polyb. Q. Curt. Diod. Sic.* See also *Ancient Universal History*, vol. xv.

† *Justin.* lib. xxi. cap. 6. and *Universal History.*

‡ *Tit. Liv. Appian and Zonaras.*

17 And Numidians. With the ancient state of the other African nations we are but very little acquainted. The Numidians, Mauritanians, Getulians, and Garamantes, are indeed mentioned by the Roman historians, who give us ample details of the battles which they fought in attempting to preserve their national independence; but we have no particular account of their different manners and customs in that age when Rome was disputing with Carthage the sovereignty of the world. All the African states of which we know any thing, were in alliance with one or other of those rival republics; and as the people of those states appear to have been less enlightened than either the Romans or the Carthaginians, we cannot suppose that they had purer morals, or a greater regard for the sacred rights of man, than the powerful nations by whom they were either protected or oppressed. They would, indeed, insensibly adopt their customs; and the ready market which Marius found for the prisoners taken in the town Capsa, although Sallust acknowledges ‡ that the sale was contrary to the laws of war, shows that slavery was then no strange thing to the Numidians. It seems indeed to have prevailed through all Africa from the very first peopling of that unexplored country; and we doubt if in any age of the world the unhappy negro was absolutely secure of his personal freedom, or even of not being sold to a foreign trader.

‡ *Bell. Jug.* cap. 91.

18 Slave-trade with the coast of Guinea begun not by the Portuguese, and would never have existed. But all this is a complication of mistakes. A learned writer has lately proved, with a force of evidence which admits of no reply *, that from the coast of Guinea a great trade in slaves was carried on by the Arabs some hundreds of years before the Portuguese embarked in that traffic, or had even seen a woolly-headed negro. Even the wandering Arabs of the desert, who never had any friendly correspondence with the Christians of Europe, have from time immemorial been served by negro slaves. "The Arab must be poor indeed (says M. Saugnier) not to have at least one negro slave. His sole occupation is the care of the herd. They are never employed in war, but they have it in their power to marry. Their wives, who are captive negresses, do all the domestic work, and are roughly treated by the Arabian women, and by the Arabs themselves. Their children are slaves like them, and put to all kinds of drudgery." Surely no man whose judgement is not completely warped by prejudice, will pretend that those roving tribes of savages, so remarkable for their independent spirit and attachment to ancient customs, learned to enslave the negroes from the Europeans. In all probability they have, without interruption, continued the practice of slavery from the days of their great ancestor Ishmael; and it seems evident, that *none of the European nations had ever seen a woolly headed negro till the year* 1100, when the crusaders fell in with a small party of them near the town of Hebron in Judea, and were so struck with the novelty of their appearance, that the army burst into a general fit of laughter *. Long before the crusades, however, we know with certainty that the natives of Guinea had been exposed to sale in foreign countries. In 651 the Mahometan Arabs of Egypt so harassed the king of Nubia or Ethiopia, who was a Christian, that he agreed to send them annually, by way of tribute, a *vast number of Nubian or Ethiopian*

* *Whitaker's Review of Gibbon's Roman History.*

19 But by the Arabs at an early period. *Saugnier and Brisson's Voyages.*

‖ *Malmsbury*, fol. p. 83.

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pian *ſlaves* into Egypt. Such a tribute as this at that time, we are told, was more agreeable to the khalif than any other, as the Arabs then made *no ſmall account of thoſe ſlaves* *.

* *Modern Univerſal Hiſtory*, vol. i. 525.

The very propoſal of ſuch a tribute, and the eſtimation in which black ſlaves were held in Egypt, ſhows that a commerce in bond ſervants could not then be a new branch of trade either to the Arabs or the Ethiopians; but the vaſt number which the Ethiopian monarch was now compelled to furniſh every year, induced him to feed this great drain upon his ſubjects from the natives of the neighbouring countries. "He ranged accordingly into all that vaſt *blank of geography* upon the map of the world, the ſpreading boſom of the African continent; and even puſhed through it to its fartheſt extremities in the weſt. He thus brought the blacks of Guinea, for the firſt time, into the ſervice and families of the eaſt; and the ſlaves which he paid in tribute to the Arabs, whether derived from the nearer neighbourhood of Ethiopia, fetched from the mediterranean regions of Africa, or brought from the diſtant ſhores of the Atlantic, were all denominated *Ethiopians*, from the country by which they were conveyed into Egypt †. "At this time, therefore, according to Mr Whitaker, began that kind of traffic in human fleſh

† *Whitaker's Review.*

"Which ſpoils unhappy Guinea of its ſons."

There are not many authors from whom, in queſtions of antiquity, we differ with greater heſitation; but, as we meet with a female Ethiopian ſlave in the Eunuch of Terence, we cannot help ſuſpecting that Guinea was occaſionally "ſpoiled of its ſons" at a much earlier period. At any rate, from the obſervations made by the European travellers who firſt penetrated into that continent, it appears undeniable that ſlavery muſt have prevailed from time immemorial among ſuch of the tribes as had never carried on any commerce with foreign nations. When Battel firſt viſited the Giagas *, thoſe people had never before ſeen a white man; yet they welcomed him and the Engliſh, with whom he had come, to their country, invited them to bring their goods on ſhore, and without heſitation loaded the ſhips with ſlaves. The Giagas were indeed waging war with the kingdom of Benguela; and being cannibals, who preſer human fleſh to all others, the ſlaves whom they had ſold to the Engliſh were probably priſoners whom they would have killed and eaten if they had not found an opportunity of otherwiſe diſpoſing of them to greater advantage. But as they had not been incited by the Europeans to eat their priſoners, there can be no reaſon to ſuppoſe that by the Europeans they had been firſt induced to ſell them; for we have ſeen that this kind of commerce prevailed in Africa among people much more poliſhed than the Giagas ſo early as in the reign of Jugurtha.

20 The negroes have enſlaved one another from time immemorial.

* *Modern Univerſal Hiſtory*, vol. xiii. chap. 47. ſect. 2.

That it was not introduced among the negroes either by the Arabs or by the Portugueſe, appears ſtill more evident from the behaviour of the Dahomans at the conqueſt of Whidah, and from the manner in which the people of Angola at the earlieſt ſtage of their foreign trade procured a ſupply of ſlaves for the Portugueſe market. The greater part of the ſlaves whom the Angolans exported from St Paulo de Loanda were brought from interior countries, ſome hundreds of leagues diſtant, where they could not have been regularly purchaſed had that commerce been till then unknown in thoſe countries. The Dahomans, in the beginning of the year 1727, had never ſeen a white man: and when their victorious prince and his army, in their rout through Whidah, firſt met with ſome Europeans in the town of Sabi, they were ſo ſhocked at their complexion and their dreſs, that they were afraid to approach them, and could not be perſuaded that they were men till they heard them ſpeak, and were aſſured by the Whidaneſe that theſe were the merchants who purchaſed all the ſlaves that were ſold in Guinea †. Slavery, therefore, if it prevailed among the Dahomans before that period, could not have been introduced among them by European or Arabian intrigues: but we are aſſured by Snelgrave, who was then in the army, that thoſe people treated their captives with ſuch horrid cruelty as was ſhocking to the natives of the ſea-coaſt, and leaves no room for doubt but that ſlavery had been practiſed among them from the earlieſt ages. A great part of their priſoners were ſacrificed to their gods or eaten by the ſoldiers; and when our author expreſſed to a colonel of the guard ſome ſurpriſe that a prince ſo enlightened as the ſovereign of Dahomy ſhould ſacrifice ſo many men whom he might have ſold to great advantage, he was gravely told, that it had been the cuſtom of their nation, from time immemorial, to offer, after victory, a certain number of priſoners to the gods; and that they ſelected the old men for victims, becauſe they were of leſs value at market, and more dangerous from their experience and cunning, than the young men. To thoſe perſons who fancy that the wars between the African princes are carried on for the ſole purpoſe of ſupplying the European ſhips with ſlaves, it may be proper to remark, that one of the kings of Dahomy ſlaughtered at once not only all the captives taken in war, but alſo 127 priſoners of different kinds, that he might have a ſufficiency of ſkulls to adorn the walls of his palace; though at the very time of that maſſacre he *knew* that there were ſix ſlave-ſhips in the road of Whidah, from which he could have got for every prime ſlave a price little ſhort of thirty pounds ſterling ‡.

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† *Modern Univerſal Hiſtory*, vol. xiii.

‡ *Dalzel's Hiſtory of the Kingdom of Dahomy.*

Theſe facts, and numberleſs others which the reader will find detailed in the 13th volume of the Modern Univerſal Hiſtory, by writers who were at the greateſt pains to procure authentic information; who were neither biaſſed by intereſt nor blinded by enthuſiaſm; and who appear to have held the infamous traffic in utter abhorrence—prove beyond the poſſibility of doubt, that ſlavery of the worſt kind muſt have prevailed among all the negro nations before they were viſited either by the Portugueſe or by the Arabs (1). Theſe two nations may

(1) The ſame thing appears from the voyages of M. Saugnier, who had an opportunity of converſing with many tribes of negroes, and who always ſpeaks of ſlavery as an eſtabliſhed practice among them; adding, that ſuch as are ſold for crimes are put to death by their own countrymen if they fly from their maſter. It appears likewiſe in a ſtill more ſtriking light from Dalzel's Hiſtory of Dahomy, where we are told that all the Dahomans,

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may indeed have been the firſt who dragged the unhappy negro from his native continent, and made his ſlavery doubly ſevere, by compelling him to labour, without his own conſent, for maſters whom he hardly conſidered as human beings.

On the beginning of this commerce, or the dreadful cruelty with which it has been carried on to the preſent day, it is impoſſible to reflect without horror: but there is ſome conſolation, however ſmall, in knowing that its original authors were not Europeans. The purchaſe of Guinea blacks for ſlaves by foreign nations commenced ages before the Portugueſe had laid that country open to the intercourſe of Europe. Even after they had made many incurſions into it, the inhabitants were as regularly purchaſed for ſlaves by ſome of the adjoining ſtates as they are now by the maritime Europeans.

21 The route by which the Arabs carried on the ſlave-trade, *Whitaker's Review*, p. 185.

"The Arabs of Egypt having reduced all the north of Africa, and carrying with them their love of black ſervants, would be ſure to open a ready communication for themſelves to their country. They certainly had one ſo early as 1512, and before the Europeans had any for that purpoſe (K). They went from Barbary by a route that was ſo much practiſed, as to be denominated expreſsly 'the way of the camels.' Meeting together at the town of Cape Cantin, or that of Valadie near it, the commercial caravan traverſed the vaſt deſerts, thoſe of Sarra, which run like the tropic of Cancer over them in a long line acroſs the country; to a place of great population called Hoden, the *Waden* or *Hoden* of our maps, and a little to the ſouth-weſt of Cape Blanco. From Hoden they turned to the left, and puſhed directly into the interior of the continent, to reach Tegazza, the *Tagazel* or *Tagaza* of our maps, and lying nearly eaſt of Hoden. Here aſſuredly they did, as the caravan does certainly at this day; and added to the other wares upon their camels a quantity of ſalt from thoſe mines of rock-ſalt, which are extraordinary enough to be noticed as rocks in our maps. This they carried, as they ſtill carry it, to Tanbut, the *Tombut* of the maps, and a town in the heart of the African continent. And from this town they turned on the right for the ſea coaſt again, and reached it in the great kingdom of Mele, the *Melli* of our maps, to the ſouth of the Gambia, and juſt at the ſpringing as it were of that grand arch of ſea which curves ſo deeply into the body of the land, and conſtitutes the extenſive gulf of Guinea. At Melli and at Tombut they received a meaſure of gold for a meaſure of ſalt. The caravan collects gold at Tombut to the preſent time; but at Melli they purchaſed gold, and alſo ſilver, in pieces as large as pebbles. And at Hoden they had *a great mart for ſlaves*; the blacks being brought thither from the countries adjoining, and bartered away to the traders. Such was the Slave Coaſt and the Gold Coaſt of former days. The ſtaple commodity of Hoden is only transferred now to Whidah; and diverted from the Arabs of Barbary to the Chriſtians of Europe," by whom the negroes are carried to the continent of America or to the Sugar Iſlands in the Weſt Indies. In theſe countries they are all ſold like beaſts in a market; but they experience very different degrees of ſervitude from the different maſters who hold them as property. Such of them as are reconciled to the appearance of white men, or have been born in the European colonies, feel themſelves as happy under a humane maſter as they could be in their native continent (L); and we believe that few of them in ſuch circumſtances have expreſſed a deſire to return."

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22 which is now tranſferred to the Europeans.

23 Condition of ſlaves in the French Weſt Indies under the old government.

In the French Weſt India iſlands, before the late revolution in the mother country, which has produced in all its dependencies anarchy and maſſacre, the condition of the negro ſlaves was better than that of the bondmen among the ancient Germans. "Thoſe of them who cultivated the plantations were attached to the ſoil, and could not be drawn off to pay debts, or be ſold ſeparately from the eſtate on which they lived. This gave them a laſting property in their huts and little ſpots of ground, which they might ſafely cultivate without dread of being turned out of poſſeſſion, or transferred contrary to their intereſt and feelings from one proprietor to another. They were under the protection of law as ſoon as they arrived in the colony. Proper miſſionaries were appointed for the purpoſe of training them up to a certain degree of religious knowledge, and ample funds were allotted for the maintenance of thoſe eccleſiaſtics. On ill treatment received from his maſter, or on being deprived of his allowance of food and raiment, the ſlave was directed to apply to the king's attorney,

mans, from the loweſt to the higheſt, acknowledge the right of the ſovereign to diſpoſe of their perſons and properties at pleaſure; and where we learn, that the ſovereign himſelf aſſured Mr Abſon the Engliſh governor at Whidah, that all his anceſtors had from time immemorial put to death every priſoner of war whom they could not ſell as a ſlave.

(K) In the year 1442, Anthony Gonſalez, a Portugueſe adventurer, reſtored to their native country ſome Mooriſh priſoners whom he had two years before forcibly carried off from the coaſt of Africa. He landed them at *Rio del-Oro*, and received from the Moors in exchange ten blacks and a quantity of gold duſt. This tranſaction proves, that a commerce in black ſervants was then regularly carried on by the Moors and not by the Portugueſe. So early as the year 1502, the Spaniards began to employ a few negroes in the mines of Hiſpaniola; but in the year following, Ovando, the governor of that iſland, forbade the further importation of them, alleging that they taught the Indians all manner of wickedneſs, and rendered them leſs tractable than formerly: and it was not till the year 1517 that the ſupply of negroes to the Spaniſh American plantations became an eſtabliſhed and regular branch of commerce. *Edwards's Hiſtory of the Weſt Indies*, Book IV. chap. ii.

(L) "I have obſerved many of my ſlaves go on board the veſſel with joy, on my aſſurance that they would be well treated and happy on the plantation where I was going to ſend them. When the Banbarans find that they are truſted by the whites, they never think of making their eſcape, chooſing to be the ſlaves of *Europeans* rather than of a *black man* who would treat them with the greateſt cruelty. *Voyages to the Coaſt of Africa by Meſſrs Saugnier and Briſſon*, p. 332. 335. Engliſh Tranſlation.

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torney, who was obliged to profecute the maſter forthwith. That officer was alſo bound to profecute, if by any other means he heard of the abuſe; the law adding as the reaſon, *This we will to be obſerved, to check the abuſe of power in the maſter* *."

* *Ramſay's Eſſay on the Treatment and Converſion of Slaves*, Sect. v.

We wiſh it were in our power to ſay, that in the Britiſh Weſt India colonies ſlaves are equally protected by law as they were in the French iſlands under the old government, and that the ſame care is taken of their moral and religious improvement. This, however, we are afraid, cannot be ſaid with truth. In the iſland of Jamaica, before the paſſing of the *conſolidated ſlave act*, not many years ago, a white man, whether proprietor or not, who had killed a negro, or by an act of ſeverity been the cauſe of his death, was, for the firſt offence, intitled to benefit of clergy, and not liable to capital puniſhment till a repetition of the crime. By the preſent law, it is enacted, "That if any perſon, whether owner or ſuperintendant of ſlaves, ſhall be convicted of having, by any act of paſſion or cruelty, occaſioned the death of any negro, it ſhall be capital for the *firſt* offence: and for the greater ſecurity of the property, and as a check on thoſe who may have the puniſhment of ſlaves in their power, it is particularly required, that every ſurgeon or doctor belonging to each eſtate ſhall ſwear to the cauſe of the death of each negro, to the beſt of his knowledge and belief; and if any negro dies, and is interred by the owner or overſeer, without the doctor's having ſeen or been ſent for to ſuch negro, in this caſe the owner or overſeer cauſing the negro to be ſo interred is liable to a proſecution for ſuch conduct."

24 In the Britiſh iſlands.

M'Neil's Obſervations on the Treatment of Negroes in the iſland of Jamaica.

This law muſt doubtleſs be productive of good effects, but being a colonial act, it cannot have the vigour of the *Code Noir;* nor do we know of any attorney in the iſland who is *obliged* to defend the rights of the negroes, or proſecute the maſter whoſe cruelty has by any means come to his knowledge. The juſtices and veſtry of each pariſh are indeed conſtituted *a council of protection*, for the expreſs purpoſe of making full enquiry into the barbarities exerciſed on ſlaves, and bringing the authors to puniſhment at the public expence; and by a new ſlave-act of Grenada, the juſtices are required annually to nominate three freeholders to be *guardians of the ſlaves*, who are to take an oath to ſee the law duly executed †. Theſe are benevolent regulations; but we doubt if protection can be ſo promptly afforded by a council of guardians as by an individual attorney who has no other employment. In ſome of the other Britiſh iſlands, we have been confidently told that the unfortunate ſons of Africa have no protection whatever againſt the tyranny of a ſordid owner, or the caprice of a boyiſh overſeer (M); though it is added, that the humanity of many maſters more than ſupplies the want of laws in every reſpect but that of improvement, and that the attachment of others has in them a like effect. In ſome caſes good ſenſe, a regard for their reputation, and a well-informed conviction of their intereſt, induce men to treat their ſlaves with diſcretion and humanity. The ſlaves of many a planter poſſeſs advantages beyond what the labourer even of Britain enjoys ‡;" yet theſe advantages all depend upon the good will of his maſter; and in no part of the Britiſh colonies are the ſlaves attached to the ſoil. This ſingle circumſtance, together with the total neglect of their moral and religious culture, makes their ſituation much leſs eligible than was that of the French ſlaves under the old government; and affords a ſtriking proof of what the humane author whom we have juſt quoted well obſerves, that "thoſe men and nations whom liberty hath exalted, and who therefore ought to regard it tenderly in others, are conſtantly for reſtraining its bleſſings within their own little circle, and delight more in augmenting the train of their dependants than in adding to the rank of fellow-citizens, or in diffuſing the benefits of freedom among their neighbours."

† *Edwards's Hiſtory of the Weſt Indies*, book iv. chap. v.

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‡ *Ramſay's Eſſays*, p. 66. and 91.

25 The lawfulneſs of ſlavery inquired into.

Having given this ample detail of the riſe and progreſs of ſlavery in the world, and ſhown that it has prevailed in every age, and under all religions, we ſhall now proceed to enquire whether a practice ſo general be in any inſtance lawful; and if it be, how it muſt be modified, in order to be rendered conſiſtent with the rights of man and the immutable laws of virtue.

That in a ſtate of nature one man has a right to ſeize upon another, and to compel him by force to labour for his ſubſiſtence, is a poſition which we believe has never been ſeriouſly maintained. But independent communities ſtand to each other in the very ſame relation that individuals do in a ſtate of nature; and therefore if in ſuch a ſtate the man of greater bodily ſtrength or mental ſagacity would have no right to convert his weaker neighbour into perſonal property, neither can the more powerful and enlightened nation have a right to carry off by force, or entice by fraud, the ſubjects of a weaker and more barbarous community for the purpoſe of reducing them to a ſtate of ſervitude. This is a truth ſo obvious as to admit neither of proof nor of denial.

In thus ſtating the caſe between two independent nations, we have in our eye that traffic in ſlaves which is carried on between the civilized Europeans and the barbarous Africans: and the utmoſt length which we think an apologiſt for that trade can go is to contend, that we may lawfully purchaſe ſlaves in thoſe countries where from time immemorial they have been a common branch of commerce. But the European right to purchaſe cannot be better than the African right to ſell; and we have never yet been informed what gives one African a right to ſell another. Such a right cannot be natural, for the reaſon which we have elſewhere aſſigned (ſee RIGHT): neither can it be adventitious; for adventitious rights are immediately derived from the municipal law, which is the public will of the ſtate. But the ſtate has no authority to deprive an innocent man of his perſonal freedom, or of the produce of his own labour; for it is only to ſecure theſe, by protecting the weak

26 The common apology for it inſufficient.

(M) In Barbadoes there is ſaid to be a law for the protection of ſlaves, which is the moſt inſolent trifling with juſtice and humanity that the writer of this article has ever ſeen. It is enacted, forſooth, "That if any man ſhall, of *wantonneſs*, or only of *bloody-mindedneſs*, or *cruel intention*, *wilfully kill* a negro or other ſlave, if his own, he ſhall pay into the public treaſury *fifteen pounds ſterling!* See *Dickſon's Letters on Slavery*, p. 4.

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weak from the violence of the ſtrong, that ſtates are formed, and individuals united under civil government.

It may perhaps be ſaid, that by patiently ſubmitting to governments which authorize the traffic in human fleſh, men virtually give up their perſonal liberty, and veſt their governors with a right to ſell them as ſlaves: but no man can veſt another with a right which he poſſeſſes not himſelf; and we ſhall not heſitate to affirm, that in a ſtate of nature where all have equal rights, no individual can ſubmit himſelf to the abſolute diſpoſal of another without being guilty of the greateſt crime. The reaſon is obvious. From the relation in which men ſtand to one another as fellow-creatures, and to God as their common Creator, there are duties incumbent upon each peculiar to himſelf; in the performance of which he can be guided only by his own reaſon, which was given him for that very purpoſe. But he who renounces his perſonal freedom, and ſubmits unconditionally to the caprice of a maſter, impiouſly attempts to ſet himſelf free from the obligation of that law which is interwoven with his very being, and chooſes a director of his conduct different from that which God has aſſigned him. A man therefore cannot put himſelf in a ſtate of unconditional ſervitude; and what he cannot do for himſelf, he ſurely cannot authorize others to do for him either by a tacit or by an open conſent.

27 No man has a right to give himſelf up to the abſolute diſpoſal of another.

Theſe conſiderations have often made us regret that writers, for whoſe talents and integrity we have the higheſt reſpect, ſhould, without accurately defining what they mean by ſlavery, have peremptorily affirmed, that, conſiſtently with the law of nature men may be reduced to that ſtate as a puniſhment for crimes, or to diſcharge debts which they cannot otherwiſe pay. That a criminal, who has forfeited his life to the laws of his country, may have his puniſhment commuted for hard labour, till death in the courſe of nature ſhall put a period to his terreſtrial exiſtence, is a truth which we apprehend cannot be controverted; but to make ſuch a commutation of puniſhments conſiſtent with the laws of nature and of nature's God, it appears to us that the kind and degree of labour muſt be preciſely aſcertained, and the conduct of the criminal not left to the capricious direction of any individual.

28 What kind of ſlavery may be employed as a puniſhment.

Puniſhments can be juſtly inflicted only for one or other of two ends, or for both. They may be calculated either to reform the criminal or to be a warning to the innocent; and thoſe which moſt effectually anſwer both theſe purpoſes are ſurely to be preferred to ſuch as anſwer but one of them. For this reaſon we conſider hard labour as a much fitter puniſhment for moſt crimes than death: but to entitle it to preference, the kind and degree of the labour muſt be aſcertained by the law; for if theſe circumſtances be omitted, and the offender delivered over as a ſlave to the abſolute diſpoſal and caprice of a private maſter, the labour to which he is condemned, inſtead of operating to his reformation, may be converted into the means of tempting him to the commiſſion of new crimes. A young woman, in the ſtate of ſervitude, would hardly be able to maintain her virtue againſt the ſolicitations of a maſter who ſhould promiſe her liberty or a remiſſion of toil upon her yielding to his deſires; and the felon, who had long been accuſtomed to a life of vagrancy and idleneſs, would not ſtrenuouſly object to the perpetration of any wickedneſs to obtain his freedom, or even a diminution of his daily taſk. Indeed ſuch temptations might be thrown in his way, as human nature could not reſiſt but by means of much better principles than felons can be ſuppoſed to poſſeſs. He might be ſcourged into compliance; or his labour might be ſo increaſed as to make him for a little reſpite eagerly embrace the moſt nefarious propoſal which his maſter could make: for being abſolute property, there is no earthly tribunal to which he could appeal for juſtice; and felons do not commonly ſupport themſelves under trials by pious meditations on a future ſtate.

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By reaſoning in this way, we are far from meaning to inſinuate that ſlave-holders in general torture their ſlaves into the commiſſion of crimes. God forbid! Many of them we know to be religious, humane, and benevolent: but they are not infallible; and ſome of them may be inſtigated, ſome of them undoubtedly have been inſtigated, by avarice and other worſe principles, to compel creatures, who are ſo abſolutely their dependents, to execute deeds of darkneſs too hazardous for themſelves. But the morality or immorality of any action, and the moral fitneſs of any ſtate, are to be judged of by their natural tendency, if the one were univerſally practiſed and the other univerſally prevalent (ſee MORAL PHILOSOPHY, N° 156.): and as the natural tendency of abſolute domeſtic ſlavery among ſuch creatures as men is to throw the moſt powerful temptations to vice in the way both of maſter and of ſlave, it muſt be in every inſtance, even when employed as a puniſhment, inconſiſtent with the fundamental principles of moral virtue.

29 Children not the property of their parents.

Some writers indeed have maintained, and the civil law ſeems to ſuppoſe, that children are the property of their parents, and may by them be ſold as ſlaves in caſes of urgent neceſſity: but if we duly conſider how property is acquired (ſee PROPERTY), and attend to the natural conſequences of ſlavery, we ſhall ſoon be convinced that this opinion is very ill founded. The rights of parents reſult from their duties; and it is certainly the duty of that man who has been the inſtrument of bringing into the world an intellectual and moral being, to do every thing in his power to render the exiſtence of that being happy both in the preſent life and in that which is to come. If this duty be conſcientiouſly diſcharged, the parent has a manifeſt right to the gratitude, love, and reaſonable obedience, of his child; but he cannot, in conſequence of any duty performed, claim a right to transfer that child as property to the uncontrolled diſpoſal of any private maſter; for this plain reaſon, that the man who is conſidered as the private property of another, cannot reaſonably be ſuppoſed to enjoy happineſs in this world, and is under many temptations to do what muſt neceſſarily render him miſerable in the next. See MORAL PHILOSOPHY, N° 138.

If criminals cannot be lawfully reduced to a ſtate of abſolute private ſlavery, much leſs ſurely can it be lawful to reduce inſolvent debtors and priſoners of war to that ſtate. Many a virtuous man, who has contracted debts with the faireſt proſpect of paying them, has been ſuddenly rendered inſolvent by fire, by ſhipwreck, or by the bankruptcy of others with whom he was neceſſarily engaged in the courſe of his trade. Such a man can be conſidered in no reſpect as criminal. He has been indeed unfortunate; but it would be groſsly unjuſt, as well

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well as ſhockingly cruel, to add to his misfortune by reducing him to a ſtate to which we have juſt ſeen that the vileſt felon cannot be reduced without a violation of the laws of morality. Fraudulent bankrupts indeed, of whom we daily ſee many, might with great propriety and the ſtricteſt juſtice be compelled to extenuate their debts by labouring for the benefit of thoſe whom they have injured; and criminals of other deſcriptions might be made to work for the benefit of the public: but in both caſes the taſk to be performed ſhould be aſcertained by the law, and the perſons of the labourers be protected by the ſtate. If ſuch can be called ſlaves, their ſlavery is undoubtedly conſiſtent with every principle of virtue and religion; for they ſuffer nothing but the due reward of their deeds. Priſoners of war, however, can upon no honeſt principle be reduced even to this ſtate of mitigated bondage; for they are ſo far from incurring guilt by fighting for their country, that even to their enemies their courage and conduct in ſuch a cauſe muſt appear worthy of reward. A victorious general has certainly a right to prevent the priſoners taken in battle from again drawing their ſwords againſt him during the continuance of the war; but there are many ways by which this may be done effectually without chaining the unfortunate captives to the oar, or ſelling them like cattle to private purchaſers, by whom they may be treated with capricious cruelty, and driven to the perpetration of the greateſt crimes.

30 Fraudulent bankrupts may be compelled to labour for the benefit of their creditors.

31 Two objections to our concluſions.

To theſe concluſions, and the reaſoning on which they are built, we are aware it may be objected, that if private ſlavery were in every inſtance unlawful and inconſiſtent with the fundamental principles of morality, it would not have prevailed among the ancient patriarchs, and far leſs have been authoriſed by the Jewiſh law.

32 The former anſwered.

In reply to this objection, it may be obſerved, that Abraham, Iſaac, and Jacob, though excellent men, were not characters abſolutely perfect; that as their practice does not authoriſe polygamy or inceſt among us, it will not authoriſe the reducing of our fellow-creatures to a ſtate of hopeleſs ſervitude; and that from the circumſtances of the age in which they lived, many things were permitted to them, and were indeed harmleſs, which are forbidden to us, and would now be pernicious. The character of Abraham appears to have been much more perfect than that of his ſon or grandſon; and was certainly equal, if not ſuperior, to that of any other mere man of whom we read either in profane or even in ſacred hiſtory. We are to remember, however, that he was born amidſt idolaters, and was probably an idolater himſelf till enlightened by the inſpiration of Jehovah, and called from his kindred and from his father's houſe. Before his converſion, he muſt have had much cattle and many ſlaves, which conſtituted the riches of that early period; and his caſe would indeed have been peculiarly hard, had he been commanded to diveſt himſelf of his ſervants, and to depart into a ſtrange country very thinly inhabited, without people to protect his flocks and herds from beaſts of prey. Nor would his loſs have contributed in any degree to the benefit of his ſlaves, who, as the ranks of men were then adjuſted, could not long have preſerved their liberty. Had they not been forcibly reduced to their former ſtate by their idolatrous countrymen, which in all probability they would have been, they muſt have ſoon ſubmitted to it, or periſhed by hunger. Let it be remembered, too, that the bond-ſervants of Abraham, though conſtituting the moſt valuable part of his property, were not conſidered as a ſpecies of inferior beings, but were treated rather as children than as ſlaves. This is evident from his ſpeaking of the ſteward of his houſe as his heir, when complaining to God of the want of ſeed. Indeed the manner in which this circumſtance is mentioned, ſhows that it was then the general practice to conſider domeſtic ſlaves as members of the family; for the patriarch does not ſay, "I will leave my ſubſtance to this Eliezer of Damaſcus;" but his words are, "Behold to me thou haſt given no ſeed; and lo, one born in my houſe is *my heir**." From this mode of expreſſion we are ſtrongly inclined to think that captives taken in war were in that age of ſimplicity incorporated into the family or tribe of the conqueror, as they are ſaid to be at preſent among the North American Indians, to ſupply the place of thoſe who had fallen in battle. If ſo, ſlavery was then a very mild thing, unattended with the evils which are now in its train, and muſt often have been highly beneficial to the captive.

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* Gen. xv. 3.

33 Anſwer to the other.

The other part of the objection appears at firſt ſight more formidable: but perhaps a little attention to the deſign of the Moſaic economy may enable us to remove it even more completely than this. We need not inform our theological readers, that one great purpoſe for which the poſterity of Abraham were ſeparated from the heathen nations around them, was to preſerve the knowledge of the true God in a world run headlong into idolatry. As idolatry appears to have had ſomething in its forms of worſhip extremely captivating to rude minds, and as the minds of the Iſraelites at the era of their departure from Egypt were exceedingly rude, every method was taken to keep their ſeparation from their idolatrous neighbours as complete as poſſible. With this view they were commanded to ſacrifice the animals which their Egyptian maſters had worſhipped as gods, and were taught to conſider hogs and ſuch other creatures as the heathen offered in ſacrifice, when celebrating their myſtical and magic rites, as too unclean to be eaten or even to be touched. Of this diſtinction between clean and unclean beaſts, God himſelf aſſigns the reaſon: "I am the Lord your God (ſays he), who have ſeparated you from other people; ye ſhall therefore put difference between clean and unclean beaſts, and between unclean fowls and clean †." For the ſame reaſon they were prohibited from intermarrying with the heathen, or having any tranſaction whatever with them as neighbours; and the ſeven idolatrous nations of Canaan they were ſtrictly commanded to exterminate. "When the Lord thy God (ſays Moſes) ſhall deliver them before thee, thou ſhalt ſmite them, and utterly deſtroy them: thou ſhalt make no covenant with them, nor ſhow mercy unto them: neither ſhalt thou make marriages with them: thy daughter thou ſhalt not give unto his ſon, nor his daughter ſhalt thou take to thy ſon; for they will turn away thy ſon from following me, that they may ſerve other gods ‡."

† Lev. xx. 24, 25, 26.

‡ Deut. vii. 2, 3, 4.

Under theſe laws, it is plain that no intercourſe whatever could have place between an Iſraelite and a man of any other nation, unleſs the latter was reduced to ſuch a ſtate as that he could neither tempt the former, nor practiſe himſelf the rites of his idolatrous worſhip.

But

Slavery, Slave-trade.

But the Iſraelites were not ſeparated from the reſt of the world for their own ſakes only: They were intended to be the repoſitaries of the lively oracles of God, and gradually ſpread the light of divine truth through other nations, till the fulneſs of time ſhould come, when in Chriſt all things were to be gathered together in one. To anſwer this end, it was neceſſary that there ſhould be ſome intercourſe between them and their Gentile neighbours; but we have ſeen that ſuch an intercourſe could only be that which ſubſiſts between maſters and their ſlaves.

Should this apology for the ſlavery which was authoriſed by the Jewiſh law be deemed fanciful, we beg leave to ſubmit to the conſideration of our readers the following account of that matter, to which the ſame objection will hardly be made. It was morally impoſſible that between nations differing ſo widely in religion, cuſtoms, and manners, as the Jews and Gentiles, peace ſhould for ever reign without interruption; but when wars broke out, battles would be fought, and priſoners would be taken. How were theſe priſoners to be diſpoſed of? Cartels for exchange were not then known: it was the duty of the Iſraelites to prevent their captives from taking up arms a ſecond time againſt them; they could not eſtabliſh them among themſelves either as artificers or as huſbandmen; for their law enjoined them to have no communication with the heathen. There was therefore no other alternative but either to maſſacre them in cold blood, or to reduce them to the condition of ſlaves. It would appear, however, that thoſe ſlaves were raiſed to the rank of citizens, or at leaſt that their burdens were much lightened, as ſoon as they were convinced of the truth of the Moſaic revelation, and received into covenant with God by the rite of circumciſion. They were then admitted to the celebration of the paſſover; concerning which one law was decreed to the ſtranger, and to him that was home-born. Indeed, when we conſider who was the legiſlator of the Jews; when we reflect upon the number of laws enacted to mitigate ſlavery among them, and call to mind the means by which the due execution of all their laws was enforced, (ſee THEOLOGY), we cannot help being of opinion that the heathen, who was reduced to ſlavery in Judea, might be happier, if he pleaſed, than when living as a freeman in his own country. But whether this be ſo or not, is a matter with which we have no concern. On account of the hardneſs of their hearts, and the peculiarity of their circumſtances, many things, of which ſlavery may have been one, were permitted to the Jews, which, if practiſed by Chriſtians, would render them highly guilty.

After treating thus largely of ſlavery in general, we need not occupy much of the reader's time with the

34 Slave-trade.

SLAVE-TRADE carried on by the merchants of Europe with the natives of Africa. It is well known that the Portugueſe were the firſt Europeans who embarked in this trade, and that their example was ſoon followed by the Dutch and the Engliſh. Of the riſe and progreſs of the Engliſh commerce in ſlaves, the reader will find a ſufficient account in other articles of this work †. That commerce, though long cheriſhed by the government as a ſource of national and colonial wealth, was from its commencement conſidered by the thinking part of the nation as a traffic inconſiſtent with the rights of man, and ſuſpected to be carried on by acts of violence. Theſe ſuſpicions were gradually ſpread through the people at large, and confirmed, in many inſtances, by evidence incontrovertible. Laws were in conſequence enacted to make the negroes more comfortable on what is called the middle paſſage, and to protect them againſt the wanton cruelty of their maſters in the Weſt Indies: but the humanity of the nation was roufed; and not many years ago a number of gentlemen of the moſt reſpectable characters, finding that no adequate protection could be afforded to perſons in a ſtate of hopeleſs ſervitude, formed themſelves into a ſociety at London, for the purpoſe of procuring a total abolition of the ſlave-trade. That the motives which influenced the leading men of this ſociety were of the pureſt kind, cannot, we think, be queſtioned; for their object was to deliver thoſe who had none to help them, and from whom they could expect no other reward for their labours of love than the bleſſings of them who were ready to periſh. To a cauſe truly Chriſtian, who did not pray for ſucceſs? or who but muſt have felt the moſt pungent regret, if that ſucceſs had been rendered doubtful, or even delayed, by the imprudence of ſome of the agents employed by the ſociety? This we apprehend was really the caſe. Language calculated only to exaſperate the planters could not ſerve the negroes; and the legiſlature of Great Britain would never ſuffer itſelf to be forced into any meaſure by the menaces of individuals.

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35 Petitions for the abolition of it.

In the year 1793, petitions were preſented to parliament for the abolition of this inhuman traffic, which gave a pleaſing picture of the philanthropy of the nation; but, unfortunately for the cauſe of freedom, it was diſcovered that many of the names ſubjoined to thoſe petitions had been collected by means not the moſt honourable. The diſcovery, perhaps, would never have been made, had not the inſulting epithets indiſcriminately heaped upon the ſlave holders provoked thoſe men to watch with circumſpection over the conduct of their opponents. The conſequence was, that ſuſpicions of unfair dealing on the part of the petitioners were excited in the breaſts of many who, though they ardently wiſhed well to the cauſe, choſe not to add their names to thoſe of ſchool-boys under age, and of peaſants who knew not what they were ſubſcribing. Let the rights of the Africans be maintained with ardour and firmneſs; but never let their advocates ſuppoſe that the cauſe of humanity requires the ſupport of artifice. Abſolute ſlavery, in which the actions of one man are regulated by the caprice of another, is a ſtate demonſtrably inconſiſtent with the obvious plan of the moral government of the world. It degrades the mental faculties of the ſlave, and throws, both in his way and in his maſter's, temptations to vice almoſt inſurmountable. Let theſe truths be ſet in a proper light by thoſe who have doubtleſs ſeen them exemplified; and they will ſurely have their full effect on the minds of a generous, and, we truſt, not an impious people (N). The trade will be generally aboliſhed; pains will be taken

† See *Company*, and *Guinea*.

(N) We have not inſiſted upon the impolicy of the ſlave-trade, or endeavoured to prove that its abolition would

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ken to cultivate the minds of the Weſt Indian negroes; and the era may be at no great diſtance when ſlavery ſhall ceaſe through all the Britiſh dominions.

36 Objection to the abolition

But what benefit, it will be aſked, will the negroes of Africa reap from an abolition of the ſlave trade? Should any thing ſo wildly incredible happen, as that all the nations of Chriſtendom, in one common paroxyſm of philanthropy, ſhould abandon this commerce in ſervants, which has been proſecuted in all ages, and under all religions; they would only abandon it to thoſe who were originally poſſeſſed of it, who ſtill penetrate into the country, and who even puſh up to Gago at the very head of the Slave coaſt; and leave the wool-headed natives of it to Mahometan maſters, in preference to Chriſtian. Under ſuch maſters they were in Judea at the time of the cruſades. Under ſuch, as we learn from Meſſrs Saugnier, Briſſon, and others, they ſtill are in the deſerts of Africa, as well as in the iſlands of Johanna and Madagaſcar *; and it is univerſally known that they enſlave one another as a puniſhment for the moſt whimſical crimes. Among them, indeed, ſlavery ſeems to be reduced to a ſyſtem, and to deſcend, as it has done in more poliſhed nations, from father to ſon; for both Saugnier and Wadſtrom † ſpeak of particular families of negroes who are exempted from that degrading ſtate by the laws of the country.

* *Aſiatic Reſearches*, vol. ii.

† *Eſſay on Coloniza-tion.*

All this we admit to be true. Moſt certainly the negroes would not be exempted from the miſeries of ſervitude, though Europe and the Weſt Indies were ſwallowed up in the ocean. The *cuſtoms* of the country, as the king of Dahomy aſſured Mr Abſon ‡, will be *made* as long as black men ſhall continue to poſſeſs their own territories, in their preſent ſtate of depravity and ignorance; and theſe cuſtoms appear to involve ſlavery of the cruelleſt kind. But if ſlavery be in itſelf unlawful, is it a ſufficient excuſe for our continuing the traffic that it is carried on by the rude negroes and the ſavage Arabs? Are people, whom we ſometimes affect to conſider as an inferior order of beings, to furniſh examples of conduct to thoſe who boaſt of their advancements in ſcience, in literature, and in refinement? Or will the benevolent Lord of all things pardon us for oppreſſing our helpleſs brethren, merely becauſe they are cruelly oppreſſed by others? It is indeed true that the natives of Guinea cannot be made really free but by introducing among them the bleſſings of religion and the arts of civil life; but ſurely they would have fewer

‡ *Dalzel's Hiſtory.*

37 of no ſtrength.

temptations than at preſent to kidnap one another, or to commence unprovoked wars for the purpoſe of making captives, were the nations of Europe to abandon the commerce in ſlaves (o). That commerce, we grant, would be continued by the Arabs, and perhaps by others of the eaſtern nations; but the ſame number of people could not be carried off by them alone that is now carried off both by them and by the Europeans. Slave-trade.

Were it indeed poſſible to put the ſlave-trade under proper regulations, ſo as to prevent all kidnapping and unjuſt wars among the Africans, to ſupply the markets; and were it likewiſe poſſible to enſure to the negroes in the Weſt Indies mild treatment and religious inſtruction; we are far from being ſure that while the natives of Guinea continue ſo rude, and their neighbours the Arabs ſo ſelfiſhly ſavage, it would be proper to abandon at once to hordes of barbarians the whole of this commerce in bond ſervants. "The trade, which in its preſent form is a reproach to Britain, might be made to take a new ſhape, and become ultimately a bleſſing to thouſands of wretches who, left in their native country, would have dragged out a life of miſerable ignorance, unknowing the hand that framed them, unconſcious of the reaſon of which they were made capable, and heedleſs of the happineſs laid up for them in ſtore §.

§ *Ramſay's Eſſay*, p. 292, &c.

Slavery is, indeed, in every form an evil; but it ſeems to be one of thoſe many evils which, having long prevailed in the world, can be advantageouſly removed only by degrees, and as the moral cultivation of the ſlaves may enable them to ſupport the rank and diſcharge the duties of free men. This is doubtleſs the reaſon why it was not expreſsly prohibited by the divine Author of our religion, but ſuffered to vaniſh gradually before the mild influence of his Heavenly doctrines. It has vaniſhed before theſe doctrines in moſt countries of Europe; and it affords us no ſmall gratification to have it in our power to record, what indeed muſt be freſh in the memory of our readers, that the abolition of the ſlave-trade was finally accompliſhed by the ſteady perſeverance and generous exertions of ſome of the moſt enlightened and reſpectable characters in the kingdom, who, after a long and arduous ſtruggle, obtained a decree of the legiſlature, prohibiting, after a limited period, the trade in ſlaves to be continued by ſubjects of Britain. The bill originated in the houſe of lords, and having undergone conſiderable diſcuſſion in the houſe of commons, finally paſſed on the 16th of March, and received his majeſty's aſſent

38 Abolition of the ſlave-trade in Britain.

would be *advantageous* to the ſugar-planters; for the planters ſurely underſtand their own intereſt better than thoſe can do, who, having never been in the Weſt Indies, are obliged to content themſelves with what information they can glean on the ſubject from a number of violent and contradictory publications. To countenance ſlavery under any form is undoubtedly immoral. This we know: and therefore upon this ground have we oppoſed the ſlave-trade, which cannot be continued without preferring intereſt to virtue.

(o) In a ſpeech which Mr Dalzel ſays the king of Dahomy made to Mr Abſon, when he was informed of what had paſſed in England on the ſubject of the ſlave-trade, are theſe remarkable words: "In the name of my anceſtors and myſelf, I aver that no Dahoman ever embarked in war merely for the ſake of procuring wherewithal to purchaſe your commodities." We muſt take the liberty to queſtion the truth of this ſolemn averment. That the ſlave-trade is not the *ſole* cauſe of the Dahoman wars every man will admit, who does not fancy that thoſe people have neither paſſions nor appetites, but for the commodities of Europe: but the bare affirmation of this bloody deſpot, who boaſted of having killed many thouſands at the *cuſtoms*, will not convince thoſe who have read either Wadſtrom's Eſſay on Colonization, or the evidence reſpecting the ſlave-trade given at the bar of the Houſe of Commons, "that no Dahoman *ever* embarked in war merely to procure ſlaves to barter for European commodities."

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assent on the 25th March 1807. The time fixed by the bill, for the total abolition of the trade, we believe, was the beginning of the following year, viz. January 1808.

We cannot conclude without expreſſing a hope, that the period is not very diſtant when the ſlaves in the Weſt Indies ſhall be ſo much improved in moral and religious knowledge, as that they may be ſafely truſted with their own freedom. To ſet them free in their preſent ſtate of ignorance and depravity, is one of the wildeſt propoſals that the ardour of innovation has ever made. Such freedom would be equally ruinous to themſelves and to their maſters; and we may ſay of it what Cicero ſaid of ſome unſeaſonable indulgences propoſed to be granted to the ſlaves in Sicily: *Quæ cum accidunt, nemo eſt, quin intelligat ruere illam rempublicam; hæc ubi veniunt, nemo eſt, qui ullam ſpem ſalutis reliquam eſſe arbitretur.*

39 Danger of a ſudden manumiſſion of ſlaves.

Thoſe of our readers who wiſh to enter into a detail of this ſubject, may conſult, with much advantage, The Hiſtory of the Riſe, Progreſs, and Accompliſhment of the Abolition of the African Slave-Trade, by Mr Clarkſon, 2 vols 8vo.

SLAUGHTER. See MANSLAUGHTER, HOMICIDE, MURDER, &c.

SLEDGE, a kind of carriage, without wheels, for the conveyance of very weighty things, as huge ſtones, bells, &c. The ſledge for carrying criminals, condemned for high treaſon, to execution, is called HURDLE. The Dutch have a kind of ſledge on which they can carry a veſſel of any burden by land. It conſiſts of a plank of the length of the keel of a moderate ſhip, raiſed a little behind, and hollow in the middle; ſo that the ſides go a little aſlope, and are furniſhed with holes to receive pins, &c. The reſt is quite even.

SLEDGE is a large ſmith's hammer, to be uſed with both hands: of this there are two ſorts, the up-hand ſledge, which is uſed by under workmen, when the work is not of the largeſt ſort; it is uſed with both the hands before, and they ſeldom raiſe it higher than their head. But the other, which is called the about-ſledge, and which is uſed for battering or drawing out the largeſt work, is held by the handle with both hands, and ſwung round over their heads, at their arm's end, to ſtrike as hard a blow as they can.

SLEEP, that ſtate of the body in which, though the vital functions continue, the ſenſes are not affected by the ordinary impreſſions of external objects. See DREAMS and PHYSIOLOGY.

SLEEP-Walker, one who walks in his ſleep. Many inſtances might be related of perſons who were addicted to this practice; but it will be ſufficient to ſelect one remarkable inſtance from a report made to the Phyſical Society of Lauſanne, by a committee of gentlemen appointed to examine a young man who was accuſtomed to walk in his ſleep.

"The diſpoſition to ſleep-walking ſeems, in the opinion of this committee, to depend on a particular affection of the nerves, which both ſeizes and quits the patient during ſleep. Under the influence of this affection, the imagination repreſents to him the objects that ſtruck him while awake, with as much force as if they really affected his ſenſes; but does not make him perceive any of thoſe that are actually preſented to his ſenſes, except in ſo far as they are connected with the dreams which engroſs him at the time. If, during this ſtate, the imagination has no determined purpoſe, he receives the impreſſion of objects as if he were awake; only, however, when the imagination is excited to bend its attention towards them. The perceptions obtained in this ſtate are very accurate, and, when once received, the imagination renews them occaſionally with as much force as if they were again acquired by means of the ſenſes. Laſtly, theſe academicians ſuppoſe, that the impreſſions received during this ſtate of the ſenſes diſappear entirely when the perſon awakes, and do not return till the return of the ſame diſpoſition in the nervous ſyſtem. Sleep-walker.

"Their remarks were made on the Sieur Devaud, a lad thirteen years and a half old, who lives in the town of Vevey, and who is ſubject to that ſingular affection or diſeaſe called *Somnambuliſm* or ſleep-walking. This lad poſſeſſes a ſtrong and robuſt conſtitution, but his nervous ſyſtem appears to be organiſed with peculiar delicacy, and to diſcover marks of the greateſt ſenſibility and irritability. His ſenſes of ſmell, taſte, and touch, are exquiſite; he is ſubject to fits of immoderate and involuntary laughter, and he ſometimes likewiſe weeps without any apparent cauſe.

"This young man does not walk in his ſleep every night; ſeveral weeks ſometimes paſs without any appearance of a fit. He is ſubject to the diſeaſe generally two nights ſucceſſively, one fit laſting for ſeveral hours. The longeſt are from three to four hours, and they commonly begin about three or four o'clock in the morning.

"The fit may be prolonged, by gently paſſing the finger or a feather over his upper lip, and this ſlight irritation likewiſe accelerates it. Having once fallen aſleep upon a ſtaircaſe, his upper lip was thus irritated with a feather, when he immediately ran down the ſteps with great precipitation, and reſumed all his accuſtomed activity. This experiment was repeated ſeveral times.

"The young Devaud thinks he has obſerved, that, on the evenings previous to a fit, he is ſenſible of a certain heavineſs in his head, but eſpecially of a great weight in his eyelids.

"His ſleep is at all times unquiet, but particularly when the fits are about to ſeize him. During his ſleep, motions are obſervable in every part of his body, with ſtarting and palpitations; he utters broken words, ſometimes ſits up in his bed, and afterwards lies down again. He then begins to pronounce words more diſtinctly, he riſes abruptly, and acts as he is inſtigated by the dream that then poſſeſſes him. He is ſometimes in ſleep ſubject to continued and involuntary motions.

"The departure of the fit is always preceded by two or three minutes of calm ſleep, during which he ſnores. He then awakes rubbing his eyes like a perſon who has ſlept quietly.

"It is dangerous to awaken him during the fit, eſpecially if it is done ſuddenly; for then he ſometimes falls into convulſions. Having riſen one night with the intention of going to eat grapes, he left the houſe, paſſed through the town, and went to a vineyard where he expected good cheer. He was followed by ſeveral perſons, who kept at ſome diſtance from him, one of whom fired a piſtol, the noiſe of which inſtantly awakened him, and he fell down without ſenſe. He was carried home and brought to himſelf, when he recollected very well the having

Sleep-walker.

having been awakened in the vineyard; but nothing more, except the fright at being found there alone, which had made him ſwoon.

" After the fits he generally feels a degree of laſſitude: ſometimes, though rarely, of indiſpoſition. At the end of one of thoſe fits, of which the gentlemen of the committee were witneſſes, he was affected with vomitings; but he is always ſoon reſtored.

" When he is awaked, he never for the moſt part recollects any of the actions he has been doing during the fit.

" The ſubject of his dreams is circumſcribed in a ſmall circle of objects, that relate to the few ideas with which at his age his mind is furniſhed; ſuch as his leſſons, the church, the bells, and eſpecially tales of ghoſts. It is ſufficient to ſtrike his imagination the evening before a fit with ſome tale, to direct his ſomnambuliſm towards the object of it. There was read to him while in this ſituation the ſtory of a robber; he imagined the very next moment that he ſaw robbers in the room. However, as he is much diſpoſed to dream that he is ſurrounded with them, it cannot be affirmed that this was an effect of the reading. It is obſerved, that when his ſupper has been more plentiful than uſual, his dreams are more diſmal.

" In their report, the gentlemen of the committee dwell much on the ſtate of this young man's ſenſes, on the impreſſion made upon them by ſtrange objects, and on the uſe they are of to him.

" A bit of ſtrong ſmelling wood produced in him a degree of reſtleſſneſs; the fingers had the ſame effect, whether from their ſmell or their tranſpiration. He knew wine in which there was wormwood by the ſmell, and ſaid that it was not wine for his table. Metals make no impreſſion on him.

" Having been preſented with a little common wine while he was in a ſtate of apathy, and all his motions were performed with languor, he drank of it willingly; but the irritation which it occaſioned produced a deal of vivacity in all his words, motions, and actions, and cauſed him to make involuntary grimaces.

" Once he was obſerved dreſſing himſelf in perfect darkneſs. His clothes were on a large table, mixed with thoſe of ſome other perſons; he immediately perceived this, and complained of it much; at laſt a ſmall light was brought, and then he dreſſed himſelf with ſufficient preciſion. If he is teaſed or gently pinched, he is always ſenſible of it, except he is at the time ſtrongly engroſſed with ſome other thing, and wiſhes to ſtrike the offender; however, he never attacks the perſon who has done the ill, but an ideal being whom his imagination preſents to him, and whom he purſues through the chamber without running againſt the furniture, nor can the perſons whom he meets in his way divert him from his purſuit.

" While his imagination was employed on various ſubjects, he heard a clock ſtrike, which repeated at every ſtroke the note of the cuckoo. There are cuckoos here, ſaid he; and, upon being deſired, he imitated the ſong of that bird immediately.

" When he wiſhes to ſee an object, he makes an effort to lift his eyelids; but they are ſo little under his command, that he can hardly raiſe them a line or two, while he draws up his eyebrows; the iris at that time appears fixed, and his eye dim. When any thing is preſented to him, and he is told of it, he always half opens his eyes with a degree of difficulty, and then ſhuts them after he has taken what was offered to him. Sleep-walker.

" The report infers from theſe facts, and from many others relative to the different ſenſes, that their functions are not ſuſpended as to what the ſleep-walker wiſhes to ſee, that is, as to all thoſe perceptions which accord with the objects about which his imagination is occupied; that he may alſo be diſpoſed to receive thoſe impreſſions, when his imagination has no other object at the time; that in order to ſee, he is obliged to open his eyes as much as he can, but when the impreſſion is once made, it remains; that objects may ſtrike his ſight without ſtriking his imagination, if it is not intereſted in them; and that he is ſometimes informed of the preſence of objects without either ſeeing or touching them.

" Having engaged him to write a theme, ſay the committee, we ſaw him light a candle, take pen, ink, and paper, from the drawer of his table, and begin to write, while his maſter dictated. As he was writing, we put a thick paper before his eyes, notwithſtanding which he continued to write and to form his letters very diſtinctly; ſhowing ſigns, however, that ſomething was incommoding him, which apparently proceeded from the obſtruction which the paper, being held too near his noſe, gave to his reſpiration.

" Upon another occaſion, the young ſomnambuliſt aroſe at five o'clock in the morning, and took the neceſſary materials for writing, with his copy-book. He meant to have begun at the top of a page; but finding it already written on, he came to the blank part of the leaf, and wrote ſome time from the following words, *Fiunt ignari pigritia—Ils deviennent ignorans par la pareſſe;* and, what is remarkable, after ſeveral lines he perceived he had forgot the *s* in the word *ignorans*, and had put erroneouſly a double *r* in *pareſſe;* he then gave over writing, to add the *s* he had forgotten, and to eraſe the ſuperfluous *r*.

" Another time he had made, of his own accord, a piece of writing, in order, as he ſaid, to pleaſe his maſter. It conſiſted of three kinds of writing, text, half text, and ſmall writ; each of them performed with the proper pen. He drew, in the corner of the ſame paper, the figure of a hat; he then aſked for a penknife to take out a blot of ink which he had made between two letters, and he eraſed it without injuring them. Laſtly, he made ſome arithmetical calculations with great accuracy.

" In order to explain ſome of the facts obſerved by the academicians which we have here mentioned, they eſtabliſh two general obſervations, which reſult from what they have ſaid with reſpect to the ſenſes and the dreams of this ſleep-walker.

" 1. That he is obliged to open his eyes, in order to recogniſe objects which he wiſhes to ſee; but the impreſſion once made, although rapidly, is vivid enough to ſuperſede the neceſſity of his opening them again, to view the ſame objects anew; that is, the ſame objects are afterwards preſented to his imagination with as much force and preciſion as if he actually ſaw them.

" 2. That his imagination, thus warmed, repreſents to him objects, and ſuch as he figures to himſelf, with as much vivacity as if he really ſaw them; and, laſtly, that all his ſenſes, being ſubordinate to his imagination, ſeem